JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

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WILLIAM HENRY ROGERS.

William Henry Rogers, one of the signers of the Incorporation Certificate of the AMERICAN PHARMACEUTICAL ASSOCIATION, as a member of the Council, joined the ASSOCIATION in 1869. Two other living members of the Council of 1888, of which Mr. Rogers was Chairman, are J. U. Lloyd and James Vernor. He was one of the organizers of New York State Pharmaceutical Association and its President in 1885.

Mr. Rogers was born in Liberty, N. Y., December 29, 1845. He began his apprenticeship in Middletown, in 1862, and served for a time with Hudnut in Brooklyn and New York; thus his experience in the drug business and pharmacy extends over a period of 64 years and he is still active and in close touch with the business management. The firm of which the subject of this sketch is the founder owns six retail drug stores, a wholesale drug business and an extensive flavoring extract manufacturing establishment; the first store was opened in 1868, and he is pleased that among his customers are many whose antecedents were friends and patrons.

Mr. Rogers is highly esteemed by the citizens of his home city and state and the recipient of many honors from them, his fellow-workers and neighbors. He retains a keen interest in all public affairs and keeps abreast of the times notwithstanding impaired eyesight.

Fred S. Rogers, a son, member of the A. PH. A., is Secretary-Treasurer of McMonagle & Rogers, Inc.; Thomas C. Rogers, another son, is a member of Orange County Bar and former District Atttorney; the daughter is the wife of W. W. Young, a retail pharmacist of Middletown.

The subject of this sketch is eighty years young (born December 29, 1845)—he has developed a philosophy which is expressed in an optimism that radiates to all who come in contact with him.

E. G. E.

EDITORIAL

E. G. EBERLE, EDITOR 10 West Chase St., BALTIMORE, MD.

THE MEETING IN PHILADELPHIA.

THIS is the last issue of the JOURNAL prior to the convention in Philadelphia and therefore the last call for Section officers to complete their work and promptly send in the prospectuses of respective Sections so that the official program may be arranged, for this must be printed shortly after this number of the JOURNAL has been mailed. Chairmen of the Sections are invited to send in their annual addresses and Secretaries their reports, so that the minutes of the sessions can be completed as soon as possible after the convention.

Philadelphia has many points of interest, historical and others, and this year there is the additional attraction of a visit to the Sesqui-Centennial Exposition. The Local Committee has completed the arrangements for the entertainments, which fit into every open period of the convention program. As usual, the ladies will be favored, but there are many features for all the members.

The pharmacy exhibit at the Sesqui will have much of interest relating to "Pharmaceutical Firsts," Philadelphia's point of contact with pharmacy of the past and present. The visit will be on Saturday, the day following the close of the annual session. Most of the historic places have been referred to and are known to all the members who will visit these shrines and historical places. Members from a distance have the opportunity of going to seashore points before or after the meeting and quite a number will remain over for the N. A. R. D. convention to be held during the following week.

This will be a memorable meeting for a number of reasons, not the least in importance being that, in all probability, steps will be taken for a vote on the location of the Headquarters Building; everyone is interested in that and the provisions which will extend the services of the AMERICAN PHARMACEUTICAL ASSOCIATION.

The address of Mr. James E. Hancock on the Museum and Procter Memorial, printed in July JOURNAL, developed some interest and it is hoped others will give expression relative to this division and the Library; both should become more than show rooms and repositories, for through them valuable services can be given to all pharmacy and drug trade activities and organizations by embodying educational and information features. The State associations can establish sections in the Museum for the preservation of items that will memorialize certain of their members, and link the history of the drug business or pharmacy of their respective States with the present conditions. Records may be preserved in the Library until such time as the States find it necessary to establish their own homes; at all times the Headquarters can collect the literature, historical material and all that pertains, so that coördinated coöperative service may be rendered; for, after all, that is what prompted the organization of the AMERICAN PHARMACEUTICAL ASSOCIATION and features its progressive activities, which will branch out to a greater service in behalf of all divisions of the drug trade and pharmacy.

Attention also should be called to the census of pharmaceutical research

published in this issue of the JOURNAL which records an addition of 58 more names than that of last year—certainly very encouraging.

The laboratory workers will continue their program, and progress has been made by the committee on the proposed book to be written, in popular style, through which the public will be informed of achievements of pharmacy.

The American Association of Colleges of Pharmacy will hold its sessions under the amended By-Laws, and as an association instead of a conference.

The National Association of Boards of Pharmacy anticipates the largest representation in its history and with the former organization will plan for the changes in pharmacy school curricula.

There are quite a number whose membership in the AMERICAN PHARMACEUTICAL ASSOCIATION antedates the 50th anniversary of that body, but only sixteen members who affiliated with the organization in 1876 or prior to that time are with us. The oldest in years and membership (1858) is Joseph L. Lemberger, of Lebanon, Pa., who is in very poor health; James Vernor, of Detroit joined the ASSOCIATION in 1866; Edward Mallinckrodt, of St. Louis, has been a member since 1869 and the picture of William Henry Rogers graces the first text page of this JOURNAL; Ex-President John Uri Lloyd's membership dates from 1870; Solomon Boehm, of St. Louis, became a member in 1871; George A. Crossman, of Taunton, Mass., John Richard Pitt of Middletown, Conn., and Frederick Belding Power, of Washington, D. C. joined in 1872; Henry Solomon Wellcome, London, England, Benjamin Thomas Fairchild, New York, Edward Wheelock Runyon, New York, Israel Hammond Shurtleff of New Bedford, Mass. and John G. Godding, of Boston became members in 1875; Charles Henry Schrank, of Milwaukee and Edward Seymour Dawson of Syracuse are "centennial year" members.

A number, who during past years shared the work and pleasures of annual conventions have departed and will be missed at the Philadelphia sessions; Ex-President Henry Milton Whelpley presided over the 50th anniversary meeting of the ASSOCIATION, and Charles Caspari, Jr. was the Secretary. We look forward to a larger organization and service, and greater achievements; we meet the friends of other years, and we pause a while to think of those not with us in our deliberations.

Other ASSOCIATION items will be found under "Societies and Colleges."

Make your arrangements to come, if you have not yet done so.—E. G. E.

PHARMACY WEEK.

THE time for "Pharmacy Week" has been fixed for the second week of October, therefore the period of October 10–16 includes the days during which drug store publicity and displays should speak for pharmacy and for you and those engaged with you as pharmacists. Even though the merchandising side may predominate in an establishment, the very fact that a pharmacist owns or conducts the store gives a prestige to the business and an assurance to the patron, whatever his intended purchase may be—there are no drugless drug stores and whatever special privileges a pharmacy may have has been given because it is supervised, owned or controlled by a pharmacist. A few have contended that their profits

would be as large if they did not have the qualifications and credentials of a pharmacist. As far as our information goes, not one has tried the experiment of eliminating pharmacy from the drug store.

In a contribution of this issue, Robert P. Fischelis quotes from a paper on "Holding the Franchise" by Dr. James H. Beal, which very clearly presents the importance of pharmacy as an essential of the drug business; the article referred to, "An Opportunity," is well worth thoughtful reading for it carries a message of growing importance. The application is a logical consideration which answers every argument relative to the part pharmacy has in the drug store even in one wherein it is almost at the vanishing point; an important lesson is taught thereby, namely that pharmacy secures the foundation of the business and has established the confidence of the patronage, not only in one store, but in all of them. It is the safeguard for pharmacists and the basis whereon all pharmacy laws must be established and especially those which restrict the practice of pharmacy.

The significance and the beneficial results of "Pharmacy Week" to pharmacy and the drug business depend upon the impress on the public, the publicity given relative to its mission; there is opportunity during fifty weeks or more each year to advertise the merchandising side of the store so very necessary for producing direct profit, during "Pharmacy Week," however, pharmacy should be the paramount topic of the drug store.

The results of the first "Pharmacy Week" were gratifying and the experience gained will be productive of greater success, because the opportunities for telling the story of pharmacy are much greater than they were last year—both the U. S. Pharmacopœia X and National Formulary V have become the Standards which can be explained by exhibits in show windows and by indoor displays; in connection therewith chemicals and galenicals can be shown. An idea is presented by the display at the recent American Medical Association meeting in Dallas—p. 495 of the June JOURNAL A. PH. A. A picture of the "Father of the United States Pharmacopœia," Dr. Lyman Spalding, with sketch, will be found on p. 674 of the August JOURNAL for 1917 and a leaf from the first U. S. Pharmacopœia on the page following. The members of the N. F. Revision Committee are shown in the April JOURNAL of this year, in the June and July Issues there are several interesting historical items and in this number a letter to the Father of the U. S. Pharmacopœia from a wholesale drug house of 1810 is reproduced. These references will suggest to the readers how a window display may be made with the standards as centers of attraction to the window, round about JOURNALS, open at pages referred to, may be placed. In another display the components of a preparation may be shown, the sources, methods of manufacture, etc. It is needless to go into further details, because everyone will embody some original idea. The message of this comment is to let pharmacy speak during its designated week.—E. G. E.

Committee on National Pharmacy Week is composed of Robert J. Ruth, 145 N. 10th St., Philadelphia; Frederick B. Kilmer, New Brunswick, N. J.; William B. Day, Chicago; W. Bruce Philip, San Francisco; Hal Emens Duncan, Birmingham, Ala., for the AMERICAN PHARMACEUTICAL ASSOCIATION. Charles Fred Wright, Boston; Joe Noble, Philadelphia; Philip Jacob Kolb, Chicago; Sam Davis, Nashville; John Culley, Ogden, for National Association of Retail Druggists.

SCIENTIFIC SECTION

EPHEDRINE AND PSEUDOEPHEDRINE, THEIR ISOLATION, CONSTITUTION, ISOMERISM, PROPERTIES, DERIVATIVES AND SYNTHESIS. (WITH A BIBLIOGRAPHY).*

BY K. K. CHEN AND C. H. KAO, MADISON, WIS.

The recent pharmacological and clinical study of ephedrine reveals the fact that it acts qualitatively the same as epinephrine and that therapeutically it can replace or be used in conjunction with epinephrine in many instances. The advantages of ephedrine over epinephrine are its prolonged action and its effectiveness by mouth. There is also a similarity in their chemical structure. It is interesting to note that while ephedrine was prepared in its pure state sixteen years before epinephrine, its physiological investigation was delayed until recently. The chemical study of this compound and its isomer pseudoephedrine has occupied the last four decades, but a résumé of the work to date is yet wanting. The writers hope that the following review may be found of value for the identification of these compounds and of assistance in further researches.

I. ISOLATION.

Ephedrine and pseudoephedrine are two natural, optically active, isomeric, plant bases. The former is laevo-rotatory while the latter is dextro-rotatory. The stem of the plant yielding ephedrine has been known as Ma Huang in Chinese medicine for more than 5000 years, and fully discussed by Li Shih-cheng in his "Pentsao Kang Mu" written in 1596 A.D. It was, however, not until 1885 that G. Yamanashi first isolated an alkaloid in its impure state from the Chinese material at the Osaka Experimental Station, Japan. After the death of the discoverer, Nagai (1887), with the assistance of Y. Hori, continued the study, and named it ephedrine. The botanical name of the plant as given by Nagai was *Ephedra vulgaris*, Rich. var. *helvetica*, Hook. et Thompson. Merck of Germany claimed to have isolated the same principle from the same variety in 1888, but made no mention as to where the plant was obtained. In 1923 Chen re-isolated the same principle at Peking, China, from the material purchased in Peking and in its vicinity. The recent pharmacological and clinical reports in this country and Canada were made with this product.

In 1889 Ladenburg and Oelschlägel published their results on a second base, named pseudoephedrine, prepared by Merck and obtained from a plant belonging to the same genus *Ephedra*. In 1902 Miller was able to isolate only pseudoephedrine and no ephedrine in the European variety. His plant was identified by Arthur Meyer as *Ephedra vulgaris* var. *helvetica*. Caesar and Loretz at Halle as quoted by Miller had the same experience. It appears, therefore, probable that the plant *Ephedra vulgaris* var. *helvetica* yields ephedrine when grown in China, but pseudoephedrine when grown in Europe. Such analogy can be found in oil of turpentine, for the French and Spanish oils contain *l*-α-pinene whereas the American and Greek oils the dextrogyrate modification.

* The expense of this work has been defrayed by a part of a grant from the Committee on Therapeutic Research, Council on Pharmacy and Chemistry, American Medical Association.

The basic principle separated from *Ephedra monostachia*, although also called ephedrine is chemically and physiologically different from the two isomers described above (Spehr, Bagoslowky, Vesternik), and therefore is not discussed here.

The method of isolating ephedrine or pseudoephedrine is most simple and follows the general principle of preparing any common alkaloid. Nagai in his early method employed acidified water for extraction, while others used alcohol. On concentrating the extract, Nagai and Merck extracted ephedrine with ether after alkalinization, whereas Ladenburg and Oelschlägel, and Chen extracted the base with chloroform after making the solution alkaline with ammonium hydroxide. The common salt (hydrochloride or sulphate) as made by those workers was by direct neutralization of the base by the corresponding acid without previous conversion to any other compound. The yield of ephedrine hydrochloride was given by Nagai as between 0.31 to 0.40 per cent of the crude material. Chen, employing pharmacopœial method of assay, reported the content of the free base, ephedrine, to vary from 0.018 to 0.091 per cent of the crude drug in the specimens he studied.

II. CONSTITUTION.

The Asiatic and European investigators (Ladenburg and Oelschlägel, Nagai, Merck) all agree that both ephedrine and pesudoephedrine have the empirical formula $C_{10}H_{15}NO$ as determined by elementary analysis, and by the depression of freezing point. The mydriatic action of ephedrine led Nagai to suspect its chemical similarity with atropine. But, on treating ephedrine with magnesium hydroxide, he could find no evidence of tropine or tropic acid. Upon decomposition with oxidizing agents or in hydrochloric acid solution, both ephedrine and pseudoephedrine yield methylamine and benzaldehyde or benzoic acid. Thus, Ladenburg and Oelschlägel (1889) recovered methylamine and benzoic acid from pseudoephedrine after the treatment with potassium permanganate. Nagai (1892) obtained the same substances by heating ephedrine in 25 per cent hydrochloric acid to 160–170° and subsequent treatment with potassium dichromate and sulphuric acid. Merck (1893) obtained methylamine and benzaldehyde which latter is soon oxidized to benzoic acid, by heating ephedrine aurichloride in hydrochloric acid with a reflux condenser on a water-bath. Schmidt (1914) resolved both ephedrine and pseudoephedrine into benzaldehyde and methylamine, by means of alkaline potassium ferricyanide, or one per cent potassium permanganate, or alkaline solution of chlorine or bromine. The presence of a benzene ring is thus established. Investigators of the East and the West further agree that both ephedrine and pseudoephedrine give a nitroso-compound, and, upon deaminization, yield a N-free compound having the empirical formula $C_9H_{10}O$ (Nagai, Miller, Schmidt, Rabe), proving that both are secondary bases, and that both contain methylamino group. Experiments further show that ephedrine does not react with hydroxylamine and phenylhydrazine (Nagai, Miller), and does not give any color reaction with phenolic reagents such as ferric chloride and Millon's reagent (Chen). The O-atom in the molecule therefore does not exist in the form of an aldehyde, a ketone, or a phenol, but in the form of an alcohol. The success in the preparation of the dibenzoyl derivative of ephedrine and pseudoephedrine establishes definitely the replaceability of the H-atoms of the —OH and =NH groups at the same time (Ladenburg and Oelschlägel, Nagai, Miller). From the above data, the partial structural

formula for both ephedrine and pseudoephedrine is $C_6H_5.C_3H_5\begin{matrix}OH\\NHCH_3\end{matrix}$ and its complete structure must conform to one of the following nine configurations:

$C_6H_5.CHOH.CH(NHCH_3).CH_3$	(1)	$C_6H_5.CH_2.CH(NHCH_3).CH_2OH$	(6)
$C_6H_5.CHOH.CH_2.CH_2(NHCH_3)$	(2)	$C_6H_5.CH(CH_2OH).CH_2(NHCH_3)$	(7)
$C_6H_5.CH_2.CHOH.CH_2(NHCH_3)$	(3)	$C_6H_5.COH(CH_3).CH_2(NHCH_3)$	(8)
$C_6H_5.CH(NHCH_3).CHOH.CH_3$	(4)	$C_6H_5.C(NHCH_3)(CH_3).CH_2OH$	(9)
$C_6H_5.CH(NHCH_3).CH_2.CH_2OH$	(5)		

Among these formulas, according to Nagai, (2) and (5) should give rise to oxalic acid upon oxidation, (3) and (6) to phenyl-acetic acid, and (7), (8) and (9) to carbon dioxide. Since none of these substances is found in the decomposition of ephedrine and pseudoephedrine, and since the two compounds do not possess equivalent specific rotation, there must be more than one asymmetrical C-atom and the —OH and —$NHCH_3$ groups must be linked to the two C-atoms nearest the benzene ring respectively. Our discussion can now be limited to (1) and (4). The decomposition of ephedrine or pseudoephedrine to benzaldehyde and then to benzoic acid is suggestive of the presence of the —OH group in the C-atom adjacent to the benzene ring. Substantial evidence for the formula (1) is found in the fact that ephedrine or pseudoephedrine on deaminization does not give rise to an ethylene-oxide corresponding to the one obtained from phenyl-methyl-oxyethylamine,

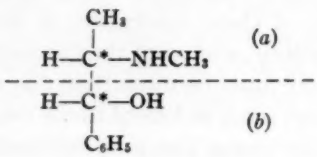
$$C_6H_5.CHNH_2.CHOH.CH_3 \longrightarrow C_6H_5.CH\begin{matrix}\diagdown\\ \\ CH_3.CH\end{matrix}\!\!\begin{matrix}\diagup\\ \\ \diagdown\end{matrix}\!O$$

(Rabe) and that ephedrine or pseudoephedrine on dehydroxylation yields a compound identical with the synthetic *d*-β-phenyl-isopropyl-methylamine, $C_6H_5.CH_2.CH(NHCH_3).CH_3$ (Ogata). The correctness of the formula (1) is finally confirmed by the synthesis and resolution to the optically active isomers (Späth and Göhring). Ephedrine or pseudoephedrine should therefore be termed chemically β-phenyl-β-hydroxy-α-methyl-ethyl-methylamine, or 1-phenyl-2-methylamino-propanol-1.

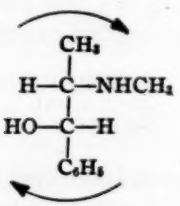
III. ISOMERISM.

It has been mentioned that ephedrine and pseudoephedrine do not possess equivalent optical rotation in the opposite direction. In configuration they are therefore not optical antimers. Under suitable conditions they can be interconverted. Nagai (1892) first observed that by heating ephedrine with 25 per cent hydrochloric acid in a sealed tube at 130–140° for 3 hours, a dextro-rotatory base of the same formula is recovered which he called *isoephedrine*. The same substance is formed when chlorephedrine hydrochloride ($C_{10}H_{14}NCl.HCl$) is heated in aqueous solution at 160° under pressure for 3 hours, or reacted upon with silver nitrate in nitric acid. Nagai made special mention that isoephedrine is not present in Ma Haung. Flaecher (1904) and Schmidt (1906) found that this isoephedrine of Nagai is identical with the natural pseudoephedrine. Transformation of ephedrine to pseudoephedrine, partially or completely, also takes place in water at 200–205° (Schmidt), with concentrated sulphuric acid (Schmidt), with sodium

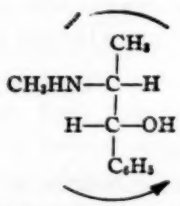
carbonate (Emde), in regeneration of the base from bromephedrine, and in the formation of acetyl-ephedrine or nitroso-ephedrine (Schmidt). In 1908 Schmidt succeeded in converting pseudoephedrine to ephedrine by heating with 25 per cent hydrochloric acid on a hot water-bath, and later (1912) Schmidt and Calliess effected the conversion with barium hydroxide. It appears obvious that either ephedrine or pseudoephedrine can undergo intramolecular rearrangement and be transformed into the other, and that there are more conditions under which ephedrine is converted to pseudoephedrine than *vice versa*. The asymmetry of these two isomers has been ably elucidated by Ogata. The structural formula of ephedrine or pseudoephedrine shows two asymmetrical C-atoms, and differs from that of tartaric acid in having unlike halves (*a*) and (*b*).



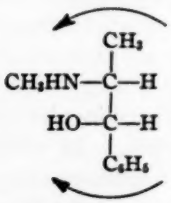
(*b*) is more optically active because of a larger molecule. There are then six possible isomers, of which the four optically active ones may be represented as follows:



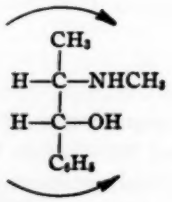
d-Pseudoephedrine
natural $(a)_D^{20}$ +61.73° (HCl)



l-Pseudoephedrine

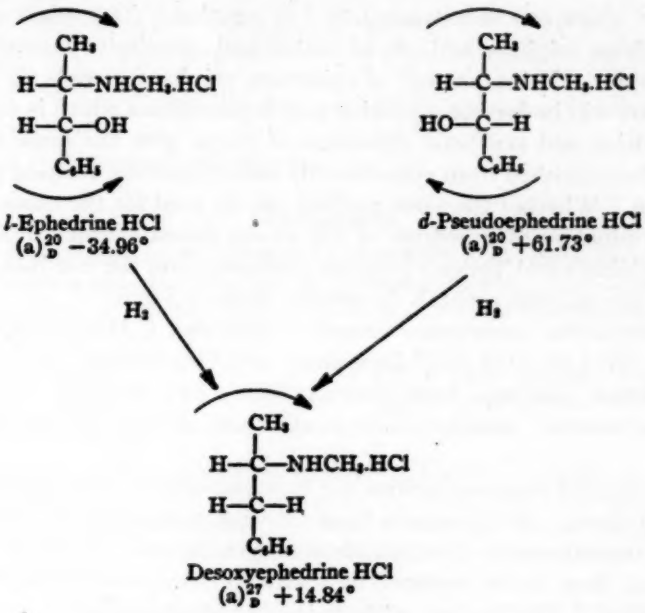


d-Ephedrine



l-Ephedrine
natural $(a)_D^{20}$ −34.96° (HCl)

In natural ephedrine, the optical rotation of (*a*) and (*b*) is in the opposite direction, whereas, in natural pseudoephedrine, that of (*a*) and (*b*) is in the same direction. Pseudoephedrine is therefore more dextro-rotatory than ephedrine is laevo-rotatory. The correctness of this view has been proved by the fact that ephedrine and pseudoephedrine, upon dehydroxylation, give rise to the same dextro-rotatory compound termed by Ogata *desoxyephedrine*, as indicated below, which is identical with the synthetic *d*-β-phenyl-isopropyl-methylamine, $C_6H_5.CH_2.CH(CH_3).NHCH_3$.



IV. PROPERTIES.

Ephedrine, $C_6H_5.CHOH.CH(NHCH_3).CH_3$ is an oily substance when shaken out with ether, but crystallizes in colorless, odorless needles or rosettes on standing. It melts at 39–40° (Nagai) and boils above 200° (Nagai, Merck). Chen in his first paper reported an abnormally high melting point (210°), but on reinvestigation found it to be due to contamination with the hydrochloride. Its specific rotation in absolute alcohol is $(a)_D^{20} - 6.3°$ (Gadamer). It is soluble in ether, chloroform, alcohol, petroleum ether, acetone and water, the aqueous solution having a strongly alkaline reaction. When dissolved in a small amount of water and heated, there is an aromatic odor evolved. Ephedrine reacts with some of the alkaloidal reagents. In the form of common soluble salts (hydrochloride or sulphate), it renders Mayer's solution turbid if dilute, but gives a white precipitate if concentrated. It produces an orange precipitate with Wagner's reagent; a greenish yellow precipitate becoming blue on standing, with phosphomolybdic acid; a heavy white precipitate with phosphotungstic acid; a yellow ring below and a pink ring above with Erdmann's reagent or concentrated sulphuric acid; and a bluish green color becoming brown on standing, with potassium dichromate and concentrated sulphuric acid (Chen). It forms crystals with auric chloride and platinic chloride, respectively, which are soluble in water but insoluble in alcohol ether mixture. It shows no visible changes with ferric chloride, Millon's reagent, tannic acid, picric acid, or concentrated nitric acid. A sensitive color test is found in its reaction with copper sulphate and sodium hydroxide, a purple color being obtained. The test was originally described by Nagai (1892), and its principle is most likely similar to the biuret reaction of proteins. The following procedure has been found by us to be satisfactory: To 1 cc. of the unknown solution, is added 0.1 cc. of 10 per cent copper sulphate and 1 cc. of 20 per cent sodium hydroxide in a 5-cc. tube. If ephedrine is present, a purplish color

is developed, which can be extracted by 1 cc. of ether. This test is sensitive to 2.5 mg. of ephedrine sulphate in 1 cc. of water and definitely positive with 5 mg. in 1 cc. of water. If the amount of ephedrine sulphate exceeds 25 mg. in 1 cc. of water, there will be formed a pinkish purple precipitate which is soluble in ether. Pseudoephedrine and synthetic ephedrine of Nagai give the same color reaction, but can be distinguished from ephedrine by their respective melting points and optical rotation. Whether the same method can be used for the quantitative colorimetric determination of ephedrine or not awaits investigation. Ephedrine is said to reduce Fehling's and Tollen's reagents gradually, and the free base to decompose the salts of several heavy metals to metallic oxides (Nagai).

Pseudoephedrine, sometimes termed *ψ-ephedrine*, $C_6H_5.CHOH.CH(NHCH_3).CH_3$, m. p. 117–118° (114–115° Ladenburg and Oelschlägel), $(a)_D^{20} + 51.2°$, forms colorless crystals, and has a faint, pleasant odor. It is rhombic, 1 : b : c = 0.84492 : 1 : 1.8598 (Schwantke), readily soluble in ether and alcohol, but sparingly soluble in cold water.

Ephedrine and pseudoephedrine are interconvertible under different conditions as discussed above. Both isomers form addition compounds by the conversion of trivalent *N* to pentavalent *N* with acids or alkyl radicals. The H-atom of the imido group of each base can be replaced by a nitroso, alkyl, acetyl, benzoyl, or phenylthiourea radical. The H-atom of the hydroxyl group can be substituted by a benzoyl or acetyl radical. The whole hydroxyl group may be replaced by chlorine or bromine (Nagai, Schmidt).

The action of hydrochloric acid on ephedrine appears to have been most thoroughly studied by Nagai. While the European scholars noticed the conversion into pseudoephedrine, Nagai, in addition, detected other by-products by varying the degree and duration of heating in a sealed tube as plainly expressed in the following steps:

$$C_6H_5.CHOH.CH(NHCH_3).CH_3 \xrightarrow[25\%\ HCl]{130\text{–}140°} C_6H_5.CHOH.CH(NHCH_3).CH_3$$
Isoephedrine

$$+ C_6H_5.CHCl.CH(NHCH_3).CH_3$$
Chlorephedrine

$$+ C_6H_5.CH_2.CO.CH_3$$
Benzyl-methyl-ketone

$$+ CH_3NH_2 + H_2O$$

$$C_6H_5.CHOH.CH(NHCH_3).CH_3 \xrightarrow[25\%\ HCl]{160\text{–}170°} C_6H_5.CH_2.CO.CH_3 + CH_3NH_2$$

The N-free fragment having the formula $C_9H_{10}O$ from the decomposition of ephedrine or pseudoephedrine is a compound of interest. It may be obtained by exhaustive methylation and subsequent distillation, by heating with 25 per cent hydrochloric acid in a sealed tube (Nagai), by heating with ethylbenzoate, or by distilling in a current of steam or carbon dioxide (Schmidt). The one from ephedrine is not identical but isomeric with the other from pseudoephedrine, for the former boils at 204°, the latter at 197–199° (Rabe). Nagai identified that obtained from ephedrine as benzyl-methyl-ketone $C_6H_5.CH_2.CO.CH_3$. Miller, Schmidt and Emde suggested that the substance might be an aromatic alcohol with an unsaturated side chain. Rabe considered them as isomeric forms of phenyl-methyl-

ethylene-oxide. Schmidt a little later (1915) reported that the product from ephedrine was a mixture of phenyl-ethyl-ketone $C_6H_5.CO.CH_2.CH_3$, and phenyl-propylene-oxide $C_6H_5.CH\underset{CH_3.CH}{\overset{|}{<}}O$. The latter, on taking up water, becomes phenyl-propylene-glycol $C_6H_5.CHOH.CHOH.CH_3$.

V. DERIVATIVES.

Ephedrine Hydrochloride, $C_6H_5.CHOH.CH(CH_3).NHCH_3.HCl$, prepared by direct neutralization of ephedrine with hydrochloric acid, or by passing dry hydrochloric acid gas into the ether solution, crystallizes in colorless, fine needles, melts at 214–216° and rotates the plane of polarized light to the left.

$(a)_D^{15} - 36.66°$ (Miller)
$(a)_D^{20} - 34.96°$ (Emde)
$(a)_D^{20} - 35.30°$ (Gadamer)
$(a)_D^{20} - 35.56°$ (Schmidt and Bümming)
$(a)_D^{20} - 35.00°$ (Chen)

It is soluble in water and alcohol and insoluble in ether. It is stable on standing or at 100°, and yields a precipitate with silver nitrate. The *platinichloride*, $(C_{10}H_{15}NO.HCl)_2.PtCl_4$, orange, long needles, m. p. 184–186° with decomposition, is soluble in water and alcohol but practically insoluble in ether. The *aurichloride*, $(C_{10}H_{15}NO.HCl).AuCl_3$, golden crystals, m. p. 128–131°, undergoes decomposition on standing, with the deposition of metallic gold.

Ephedrine hydriodide, $C_{10}H_{15}NO.HI$, m. p. 155–156°, forms rhombic, hemihedral crystals, a:b:c = 0.73703:1:0.28643 (Schwantke).

Ephedrine sulphate, $(C_{10}H_{15}NO)_2.H_2SO_4$, colorless, plate-like, rhombic crystals, m. p., 235–236°, is soluble in water and warm alcohol, but difficultly soluble in cold alcohol or ether alcohol mixture. The melting point is constant only after numerous recrystallizations as shown below:

Fraction of crystallization	m. p.	Fraction of crystallization	m. p.
First	211–212°	Twelfth	235–236°
Second	212–213°	Mixture of several high fractions	
Third to Seventh	227–228°	from one preparation	234–235°
Eighth	235–236°	Mixture of several high fractions	
		from another preparation	235–236°

This salt is of practical value because it is more easy to crystallize from alcohol than the hydrochloride.

Ephedrine bisulphate, $C_{10}H_{15}NO.H_2SO_4$, is difficultly soluble in water (Nagai).

Ephedrine nitrate, $C_{10}H_{15}NO.HNO_3$, colorless, transparent, flat needles, has about the same solubility as the sulphate.

Ephedrine acetate, $(C_{10}H_{15}NO).HOOC.CH_3$, colorless, crystalline needles, hygroscopic, is easily soluble in alcohol and ether.

Ephedrine hydrobromide, phosphate, oxalate, tartrate, citrate, benzoate and *salicylate* are said to have been prepared by Hori (Nagai).

Pseudoephedrine hydrochloride, colorless slender needles, m. p. 176°, $(a)_D^{20} + 61.73°$ to $+ 62.05°$ (Emde, Flaecher), is very soluble in water and alcohol. The *aurichloride* crystallizes from water in long, branching needles. The *platinichloride, picrate, periodate, cadmium iodide* and *bismuth iodide* appear to be oily substances.

Pseudoephedrine hydriodide, m. p. 172° (165° Ladenburg and Oelschlägel), is rhombic, holohedral (bipyramidal), a:b:c = 0.60282:1:1.3722 (Schwantke).

Pseudoephedrine hydrobromide, best crystallized from water, melts at 174–175°.

Nitrosoephedrine, $C_6H_5.CHOH.CH(CH_3).NCH_3NO$, easily prepared with nitrous acid, is a yellow oily mass which solidifies on standing into flat needles, m. p. 92° (Nagai), soluble in alcohol and ether but difficultly soluble in cold water, and decomposes in hot water.

Nitrosopseudoephedrine melts at 80–82° (Ladenburg and Oelschlägel), Schmidt and Calliess (1912) claimed that ephedrine and pseudoephedrine yield the same nitroso-compound, m. p. 80°, due to the conversion of ephedrine to pseudoephedrine with nitrous acid.

Ephedrine-phenyl-thiourea, $C_6H_5.CHOH.CH(CH_3).N(CH_3)(CS.NH.C_6H_5)$, prepared from phenyl mustard oil (Gadamer), m. p. 115° with decomposition, $(a)_D^{20} - 105.1°$, rosette prisms, is rhombic, hemihedral, sphenoidal, a:b:c = 0.81703:1:0.42834 (Blass).

Pseudoephedrine-phenyl-thiourea, m. p. 122° without decomposition, $(a)_D^{20} + 22.8°$, is rhombic, a:b:c = 0.37134:1:0.62669.

Benzoyl-ephedrine, $C_6H_5.CHOH.CH(CH_3).N(CH_3)(C_6H_5.CO)$, colorless transparent crystals, m. p. 113°, is soluble in hot alcohol, but difficultly soluble in water (Nagai).

Benzoyl ester of benzoyl-ephedrine, $C_6H_5.CH(O.C_6H_5.CO).CH(CH_3).N(CH_3)(C_6H_5.CO)$, colorless, transparent, flat needles, m. p. 134° reported by Nagai (115–116° Miller), is soluble in ether, chloroform and alcohol, but insoluble in water. The *dibenzoyl derivative of pseudoephedrine* melts at 119–120° (Ladenburg and Oelschlägel).

Acetyl-ephedrine, $C_6H_5.CHOH.CH(CH_3).N(CH_3)(CH_3.CO)$, m. p. 87°, was first prepared by Nagai (1892). Miller (1902) made two different monoacetyl ephedrines: One with acetic anhydride and sodium acetate, the *platinichloride* of which melts at 210°; the other in the absence of sodium acetate, the *platinichloride* of which melts at 185°. He suggested that in one the acetyl group is attached to the N-atom, and in the other to the O-atom. Schmidt and Calliess (1912) obtained an identical monoacetyl derivative from ephedrine and pseudoephedrine, and believed that during acetylation ephedrine is converted to pseudoephedrine. Their compound melts at 101°, its *hydrochloride* at 176°, $(a)_D^{20} + 96.8°$, its *platinichloride* at 184°, and its *aurichloride* at 165°. Upon heating, acetyl-ephedrine hydrochloride yields acetic acid, chloroephedrine isoephedrine and ephedrine (Nagai).

Methyl-ephedrine, $C_6H_5.CHOH.CH(CH_3).N(CH_3)_2$, prepared with methyl iodide in methyl alcohol, colorless, transparent prisms, m. p. 84° (Nagai) (59–62° Miller; 78° Eberhard), $(a)_D^{15}$ −18.96 (Eberhard), is soluble in ether, chloroform, carbon bisulphide, alcohol, and slightly soluble in cold water giving basic reaction, and decomposes the salts of several heavy metals to metallic oxides. The *hydrochloride*, m. p. 182–186° (Eberhard), is soluble in water and alcohol. The *oxalate* is also soluble in water and alcohol. The *aurichloride*, m. p. 120–123° (Miller), (129° Eberhard), forms yellow thin plates. The *platinichloride*, m. p. 155–160° (181° Eberhard), is easily soluble in water, alcohol and ether. The *mercurichloride* is soluble in hot water, but difficultly soluble in cold water. The *benzoyl derivative* has been prepared (Nagai).

Methyl-pseudoephedrine is an oily base, the *aurichloride* of which melts at 119–123° (Emde).

Methyl-ephedrine-methyl-iodide, $C_6H_5.CHOH.CH(CH_3).N(CH_3)_3I$, is a by-product of the preparation of methyl-ephedrine, in colorless, prismatic crystals, rhombic, hemihedral, a:b:c = 0.97926:1:0.76088 (Schwantke), m. p. 203° (199° Emde), easily soluble in alcohol and warm water but difficultly soluble in cold water. Upon treatment with silver chloride, *methyl-ephedrine-methyl chloride*, $C_6H_5.CHOH.CH(CH_3).N(CH_3)_3Cl$, right angled plates, m. p. 230°, $(a)_D^{15} - 30.54°$ (Eberhard), is obtained of which the *aurichloride* melts at 188–190°, the *platinichloride* at 247° (250° Emde), and the *mercurichloride*, $C_{10}H_{14}NO(CH_3).CH_3Cl.3\frac{1}{2}HgCl_2$, forms colorless cubes, difficultly soluble in water (Merck). The *acetyl derivative*, $C_{10}H_{13}NO(CH_3).CH_3Cl.(CH_3.CO)$, forms a *platinichloride*, m. p. 186–188° (Miller).

Methyl-pseudoephedrine-methyl-iodide, rhombic, holohedral (bipyramidal), a:b:c = 0.64227:1:1.2088 (Schwantke), melts at 205°. *Methyl-pseudoephedrine-methyl-chloride* forms a *platinichloride*, m. p. 204–205°, and an *aurichloride*, m. p. 194° (Emde).

Methyl-ephedrine (and pseudoephedrine)-methyl-hydroxide, $C_6H_5.CHOH.CH(CH_3).N(CH_3)_3OH$, can be prepared by treating silver oxide with methyl-ephedrine (or pseudoephedrine)-methyl-iodide. Upon distillation it yields trimethylamine and a N-free fragment having the empirical formula $C_9H_{10}O$ the nature of which has been discussed above. This substance may condense with ephedrine in the reaction of methyl-ephedrine-methyl-iodide with sodium amalgam (Eberhard), and has been known under the name of *ephedrine-phenyl-propylene-oxide*. $C_{10}H_{15}NO.C_9H_{10}O$, plates, m. p. 125°, $(a)_D^{15} - 3.59°$ to −3.63°. The *hydrochloride*, right-angled plates, m. p. 155–156°, $(a)_D^{15} + 14.74°$ to + 14.93°, forms an *aurichloride*, m. p. 144–145°, and a *platinichloride*, m. p. 176.5–177°. Methylation of this compound under various conditions yields two isomeric derivatives: the methyl-iodide and methyl-chloride of the one melt at 183° and 203°; whereas the corresponding iodide and chloride of the other melt at 164° and 165–167°, respectively.

Ethyl-ephedrine, $C_6H_5.CHOH.CH(CH_3).N(CH_3)C_2H_5$, prepared in the same manner as methyl-ephedrine (Nagai), forms a *hydrochloride*, m. p. 156°, and a *platinichloride*, m. p. 97°.

Benzal-ephedrine, $C_6H_5.CHOH.CH(NHCH_3).CH:CH.C_6H_5$, formed in the decomposition of ephedrine by potassium ferricyanide or potassium permanganate (Schmidt), m. p. 72–73°, slowly decomposed in the cold, rapidly when heated, forms a *platinichloride* and an *aurichloride* which are reddish yellow powders. *Benzal-pseudoephedrine*, similarly prepared, m. p. 65°, forms a *platinichloride* which is also a reddish yellow powder.

Chlorephedrine, $C_6H_5.CHCl.CH(CH_3).NHCH_3$, can be prepared by heating ephedrine in hydrochloric acid, or by treating ephedrine with phosphorus pentachloride (Nagai), as shown below:

$$C_6H_5.CHOH.CH(CH_3).NHCH_3 \xrightarrow{HCl} C_6H_5.CHCl.CH(CH_3).NHCH_3 + H_2O \quad (1)$$

$$C_6H_5.CHOH.CH(CH_3).NHCH_3 \xrightarrow{PCl_5} C_6H_5.CHCl.CH(CH_3).NHCH_3 + POCl_3 + HCl \quad (2)$$

It is colorless, viscous, transparent liquid, with "anesthetic odor," alkaline in solution, soluble in alcohol and ether, difficultly soluble in water, decomposes salts of heavy metals to metallic oxides, and gives the nitroso reaction. When treated with silver nitrate and nitric acid, pseudoephedrine (isoephedrine) is produced. The *hydrochloride*, small colorless needles, m. p. 168–170°, forms an *aurichloride*, m. p. 118°, and a *platinichloride*, a yellow powder.

Bromephedrine, $C_6H_5.CHBr.CH(CH_3).NHCH_3$, prepared from phosphorus pentabromide and ephedrine (Schmidt and Bümming), forms a hydrobromide, plates or leaflets, m. p. 174.5°, $(a)_D^{19}$ −92.54°. On standing, or reacting with silver nitrate, pseudoephedrine is regenerated. The *platinichloride* melts at 188–189°, the *aurichloride* at 138–139°, and the *acetyl derivative*, prisms, $(a)_D^{15}$ + 80°, at 175°. *Brompseudoephedrine* is identical with bromephedrine.

Desoxyephedrine (Ogata), or β-phenyl-isopropyl-methylamine, $C_6H_5.CH_2.CH(CH_3).NH.CH_3$, is dehydroxylated ephedrine or pseudoephedrine, prepared by treating the base with hydriodic acid and yellow phosphorus. Both yield the same compound. It is a liquid, having an amine odor, and boils at 208–210°. The *hydrochloride*, $(a)_D^{27}$ + 14.8°, melts at 170–171°, the *bitartrate* at 118–119°, the *mercurichloride* at 152–153°, the *aurichloride* at 127°, the *platinichloride* at 214–215°, and the *picrate* at 144.5°. The same compound was prepared by Nagai and Schmidt.

Ephedridin (Nagai), $C_6H_5.CH:C(CH_3).NHCH_3$, is anhydrous ephedrine, obtained by heating chlorephedrine. It boils at 185°, and forms a *hydrochloride*, m. p. 174°, and an *aurichloride*, m. p. 135°. Schmidt (1914) also prepared an anhydrous ephedrine, named *apoephedrine*, from either ephedrine or pseudoephedrine with concentrated sulphuric acid, to which Schmidt ascribes the formula

$$C_6H_5.C.CH(CH_3).NHCH_3$$
$$\|$$
$$C_6H_5.C.CH(CH_3).NHCH_3.$$

The *dibromide*, *platinichloride* and *aurichloride* are all amorphous.

Mydriatine (Nagai), $C_6H_5.CHOH.CH(CH_3).NH_2$, is demethylated ephedrine. Its mydriatic action is believed to be more powerful than that of ephedrine (Amatsu and Kubota).

Mydrine (Merck), is not a chemical entity, but a mixture of ephedrine and a trace of homatropine for ophthalmological uses.

VI. SYNTHESIS.

The success in the synthesis of ephedrine and pseudoephedrine marks one of the triumphs attained in the field of synthetic organic chemistry. Schmidt and his associates made various attempts to convert cinnamylamine, $C_6H_5.CH:CH.CH_2.NH_2$, and phenyl-ethyl-ketone, $C_6H_5.CO.CH_2.CH_3$, to ephedrine but they did not succeed in obtaining the desired compound.

Nagai (1909), by treating phenyl-ethyl-ketone with nitrous acid and subsequent reduction and methylation, also could find no trace of ephedrine. Later, he succeeded in making a racemic ephedrine, and patented it (1916) in the United States, Canada and England, under the name of *methyl-mydriatine*. His process

consists of condensation of benzaldehyde with nitroethane in weak alkali, and subsequent reduction in the presence of formaldehyde, as shown below:

$$C_6H_5.CHO + CH_3.CH_2.NO_2 \longrightarrow C_6H_5.CHOH.CH(CH_3).NO_2$$

$$\xrightarrow[HCHO]{Zn + CH_3.COOH} C_6H_5.CHOH.CH(CH_3).NHCH_3.(CH_3COOH)$$

$$\xrightarrow{HCl} C_6H_5.CHOH.CH(CH_3).NHCH_3.HCl$$

The *hydrochloride*, m. p. 182°, reacts with cupric hydroxide as ephedrine hydrochloride. It is said that Nagai resolved his product into *l*- and *d*-varieties, and reported the results to the Tokyo Chemical Society in 1918 (Ogata).

It was not until the method of methylation was improved that Schmidt's original suggestion of synthesizing ephedrine from phenyl-ethyl-ketone was realized. Thus Eberhard succeeded in obtaining an inactive ephedrine by reduction of α-methylamino-ethyl-phenyl-ketone, $C_6H_5.CO.CH(CH_3).NHCH_3$ (1915), and later (1920) by treatment of α-bromethyl-phenyl-ketone, $C_6H_5.CO.CHBr.CH_3$, with methylamine. The *base*, as reported by him (1915), melts at 114–115°, the hydrochloride at 180–181°, the *aurichloride* at 126°, and the *platinichloride* at 190–191°.

Fourneau (1904), by treating phenyl-propylene-iodohydrin, $C_6H_5.CHOH.CHI.CH_3$, with methylamine, obtained a compound having the formula of ephedrine (the *base*, b. p. 155–156°/31, m. p. 60°; the *hydrochloride*, m. p. 178°; the *dibenzoyl derivative*, m. p. 92°). The same substance was apparently obtained later by Fourneau and Puyal (1922) and Fourneau and Kanao (1924). In one instance, phenyl-ethyl-carbinol is dehydrated, and the resulting phenyl-propylene brominated and treated with methylamine; while in the other, phenyl-ethyl-ketone is brominated, treated with methylamine and reduced as shown below:

$$C_6H_5.CHOH.CH_2.CH_3 \xrightarrow{-H_2O} C_6H_5.CH:CH.CH_3 \qquad (1)$$

$$\xrightarrow{Br_2 + HOH} C_6H_5.CHOH.CHBr.CH_3$$

$$\xrightarrow{CH_3NH_2} C_6H_5.CHOH.CH(NHCH_3).CH_3$$

$$C_6H_5.CO.CH_2.CH_3 \xrightarrow{Br_2} C_6H_5.CO.CHBr.CH_3 \qquad (2)$$

$$\xrightarrow{CH_3NH_2} C_6H_5.CO.CH(NHCH_3).CH_3$$

$$\xrightarrow{Na\text{-}Hg} C_6H_5.CHOH.CH(NHCH_3).CH_3$$

By acetylation those authors state that they were able to isolate pseudoephedrine identical with the natural (the *base*, m. p. 117°; the *hydrochloride*, m. p. 175°).

Späth and Göhring (1920) finally succeeded in isolating all the optically active ephedrines and pseudoephedrines. Their method of preparing the inactive compound, requiring propionaldehyde and phenyl-magnesium-bromide, differs considerably from any of their predecessors, and is illustrated below:

$$CH_3.CH_2.CHO \xrightarrow{Br_2} CH_2.CHBr.CHO$$

$$\xrightarrow{HBr + CH_3OH} CH_2.CHBr.CHBr(OCH_3)$$

$$\xrightarrow{C_6H_5.MgBr} C_6H_5.CH(OCH_3).CHBr.CH_3$$

$$\xrightarrow{CH_3NH_2} C_6H_5.CH(OCH_3).CH(NHCH_3).CH_3$$

$$\xrightarrow{HBr} C_6H_5.CHOH.CH(NHCH_3).CH_3$$

The final product is *dl-pseudoephedrine* (the *base*, m. p. 117–117.2°; the *hydrochloride*, m. p. 164°; the *aurichloride*, m. p. 186–187°). The *l-pseudoephedrine* is first separated as *d*-tartrate (the *base*, m. p. 118–118.7° $(a)_D^{22.5}$ − 52.5°; the *hydrochloride*, m. p. 181.5–182.5°, $(a)_D^{20}$ − 62.1; the *aurichloride*, m. p. 126.5–127.5°; the *phenyl-thiourea*, m. p. 120–121°, $(a)_D^{20}$ − 23.1°, and the *d-tartrate*, m. p. 178°). The *d-pseudoephedrine* is identical with the natural pseudoephedrine (the *l-tartrate*, m. p. 178.5°). By heating with hydrochloric acid, *d*-pseudoephedrine is converted to *l-ephedrine* which is identical with the natural ephedrine. Similarly, *l*-pseudoephedrine can be converted to *d-ephedrine* (the *base*, m. p. 39–40°; the hydrochloride, m. p. 217.3–217.7°, $(a)_D^{20}$ + 35.8°). A mixture of equal quantity of each base constitutes *dl-ephedrine* (the *base*, m. p. 73–74°; the *hydrochloride*, m. p. 188.5–189°). Recently, Späth and Koller (1925) achieved another method of synthesizing racemic pseudoephedrine from benzaldehyde through phenyl-propylene, as shown in the following steps:

$$C_6H_5.CHO \xrightarrow{C_2H_5MgBr} C_6H_5.CH(OMgBr).CH_2.CH_3$$

$$\xrightarrow{H_2O} C_6H_5.CHOH.CH_2.CH_3 \xrightarrow[POCl_3]{(CH_3.CO)_2O} C_6H_5.CH:CH.CH_3$$

$$\xrightarrow{HCl} C_6H_5.CHCl.CH_2CH_3$$

$$\xrightarrow{C_5H_5N} C_6H_5.CH:CH.CH_3$$

$$\xrightarrow{Br_2} C_6H_5.CHBr.CHBr.CH_3$$

$$\xrightarrow{CH_3OH} C_6H_5.CH(OCH_3).CHBr.CH_3$$

$$\xrightarrow{CH_3NH_2} C_6H_5.CH(OCH_3).CH(NHCH_3).CH_3$$

$$\xrightarrow[NaOH]{HBr} C_6H_5.CHOH.CH(NHCH_3).CH_3$$

The molecular isomer of ephedrine, 1-phenyl-1-methylamino-propanol-2-$C_6H_5.CH(NHCH_3).CHOH.CH_3$, has been synthesized and called ephedrine by some (Emde, Fourneau).

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DOES CASCARA SAGRADA CONTAIN A TANNIN?*

BY JOSIAH C. AND BERTHA L. DEG. PEACOCK.

As the official drug, Cascara Sagrada, the last four revisions of the United States Pharmacopœia have recognized the dried bark of the trunk and branches of *Rhamnus Purshiana*, DeCandolle.

Except for use as a cathartic by the Indians of the Pacific slope of North America, this bark was not employed until about fifty years ago, at which time its purgative effects were brought to the attention of the medical profession.

While the history of the introduction of cascara sagrada, the botany of the drug and all branches of its pharmacology have been dealt with by many contributors to this knowledge, reference will be limited to such parts of the literature of this and other drugs as shall seem to be needed for a relevant report on the question under consideration.

As mentioned by Warren (JOUR. A. PH. A., p. 254, (1924)) although this drug has been the subject of research by many skilful analysts its chemistry is still obscure and "the subject is so full of interrogation points that no one can to-day assert with assurance a statement of the exact chemical constituents of this drug."

That is true not only as regards the important constituents of cascara but equally the case with respect to the medicinally unimportant principles, as for example "tannin," which is listed as a constituent of ranking importance by some text and reference books, while other books do not mention tannin as present in this drug.

In the hope of removing one of the aforesaid interrogation points by determining the presence or absence of tannin, this review of the literature and examination of the bark were undertaken.

It is also true that, while much has been written on cascara sagrada, the matter of tannin as a constituent has had but casual consideration, as will be made evident by bringing the comparatively few and very meagre references together.

That such has been the case is not at all strange, as cascara bark would scarcely be suspected of containing a tannin if decision had to depend on the recognition of an astringent taste, for bitterness is the continuous impression from the first

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effect to the final passing of taste. And here may be noted the fact that the barks, berries and other parts of plants of the family *Rhamnaceæ* have found no use in leather making, except to a limited extent as stains for the already tanned skin.

There has long been an understanding that cascara sagrada should be collected at least one year before being used, and the tenth revision of the U. S. P. specifically directs for the first time that this requirement be observed. This detail is mentioned because there is reference to age of material used by certain workers who will be quoted in the course of this article.

Long before 1877, when this drug was made known to the medical profession, the similar bark of a related Old World species, *Rhamnus frangula*, then generally called buckthorn bark, but later "frangula," was to some extent used as a purgative.

As early as 1849, Biswanger (*Buchner's Repert. für Pharm.*) reported the bark of *Rhamnus frangula* to contain a yellow coloring principle, an ether-soluble amorphous resin, one or more alcohol-soluble resins, a bitter substance of resinous nature to which the purgative property of the bark was attributed, sugar, gum, tannin, plant acids, extractive, etc.

Whether the bark of *Rhamnus frangula* was in some instances substituted for that of *Rhamnus Purshiana*, or whether some of the early impressions regarding the chemistry of cascara sagrada were influenced by existing opinions and beliefs pertaining to frangula bark, there seems to be in some of the early literature a tendency to ascribe to cascara sagrada every virtue if not every constituent known for frangula.

In 1878, Prescott published in "New Preparations" the first analysis of cascara sagrada. His results were reprinted in full in the April number of the *Am. J. of Pharm.* for 1879. He reported an examination which embraced a study of the structure of the bark and of its chemical constituents; but he made no reference to the scheme of analysis that he followed, nor of any special procedure for the isolation of the nine substances which he reported. Among these he mentioned "a tannic acid, giving brownish green color with ferric salts."

Though Prescott gave no further outline of his recognition of this particular constituent, it is fair to presume that he followed the system of analysis suggested in his book "Outlines of Proximate Analysis," which had been in use by his own classes since 1874, or the methods given in his "Organic Analysis," which was published in 1887. Both of which books mention the methods of identifying "tannins" which are given in the general scheme of plant analysis suggested by Parson, Dragendorff and others whom Prescott followed, as acknowledged in his prefaces to these volumes.

While taste does not indicate the presence of tannin, a drop of ferric chloride solution put on any section of cascara sagrada and allowed to dry produces a dark green or blackish color which is likely to lead to the belief that tannin is present. And it is probable that this behavior and Prescott's report became the basis of statement that cascara sagrada contains "a tannic acid."

Hooper's opinion (*Pharm. Jour. & Trans.*, 3rd ser., vol. 18, p. 681 (1888)) that the bark of *Rhamnus Wightii* contains more tannin than that of *R. Purshiana* does not appear to have been formed from an actual comparison of the two barks, but was drawn by interpreting the presence of "tannic substances" from the reactions obtained with iron salts when making an examination of the bark of *R. Wightii* alone.

Illustrative of the possible uncertainty in the recognition of cascara sagrada, as late as 1892, Maisch ("Organic Materia Medica"), in describing the barks of *R. Purshiana* and *R. californica*, said that "both these barks when masticated color the saliva yellow and resemble also frangula bark in their behavior to alkali and ferric chloride." And, following this remark, "tannin" is given prominence as the first-named in his list of constituents of cascara sagrada.

When enumerating the constituents of the fruit of *Rhamnus catharticus*, commonly called buckthorn berries, Maisch (*loc. cit.*) names among others "rhamnin (yellowish granules, tasteless, olive-green by ferric salts)" and he also mentions "tannin," but makes no comment on the deportment of it toward ferric salts or other reagents.

It is very evident, however, that pharmacognosists soon learned that the assumption of the presence of tannin from the behavior with ferric salts is not altogether warranted, for not one of the several who have dealt with cascara sagrada so ably and exhaustively has made any mention of the use of ferric compounds as a means to recognition or of differentiation. This avoidance becomes an impressive fact when the intensity of the reaction as shown by whole or ground bark, or by the decoction, is considered.

As regards pharmacognostical reference to tannin as a constituent of cascara sagrada, Perrot (*Jour. Pharm. Chim.* (6) 13, 161), as abstracted in PROC. AMER. PHARM. ASSOC., 1901, p. 741, is quoted as follows—"The powder of the latter bark (*R. frangula*) contains numerous collenchymatous cells and corky layers markedly impregnated with red-brown tannin, which are not present in the bark of *Rhamnus Purshiana*."

But reference to the original article reveals the fact that Perrot reported the presence in the bark of *R. frangula* of a "rouge-brun" "matiere tannoide," and in the bark of *R. Purshiana* of a "jeune-brun" "matiere tannoide;" but he makes no statement on the means whereby he reached the conclusion that the cell contents of either drug is "matiere tannoide," while this qualified designation of the two substances implies "tannin-like" rather than "tannin."

Another mention of tannin as a constituent of this drug was made by Dohme and Engelhardt in their contribution to "The Chemistry of Cascara Sagrada," which they presented to the AMERICAN PHARMACEUTICAL ASSOCIATION in 1897 and published in the ASSOCIATION'S PROCEEDINGS for that year. Their reference to tannin will be quoted when a description of our repetition of this part of their work is given.

In 1904, Jowett presented to the same ASSOCIATION his "Chemical Examination of Cascara Bark." In this study, which was published in the A. PH. A PROCEEDINGS for that year, Jowett's only mention of tannin as a constituent was in noting 2.4 and 3 per cent of "tannin" for the two samples of this bark (aged 1 and 3 years, respectively), which he determined by the hide-powder absorption method (while a 2-year old sample of bark of *R. californica* gave indications of 3.9 per cent).

He used precipitation by lead acetate and subacetate as means to the observation of those fractions of his material in which he would have expected to encounter any tannin that the drug might contain; and he recovered by action of hydrogen sulphide from these precipitates certain substances which he described as "regenerated;" but though he made no reference whatsoever to tannin as present

in any of the material so examined, he stated specifically that emodin was "the only definite product isolated directly from the lead acetate precipitate."

Jowett also reported that the active principle or principles of cascara "are contained in that portion of the alcoholic extract which is soluble in water and precipitated by lead subacetate" and that "furthermore, it is contained in that portion of the regenerated lead subacetate precipitate which is soluble in ethyl acetate." It is well to note that in this fraction would likely have been any water-soluble tannin that had escaped precipitation by lead acetate. And it is particularly noteworthy that his water-soluble portions of the ethyl acetate extract of the substances regenerated from both the lead acetate and lead subacetate precipitates gave dark-brown colors with ferric chloride.

Immediately following the reading of Jowett's results to the ASSOCIATION, Nelson presented to the same meeting his "Notes on The Pharmacology of Cascara Sagrada and Bitterless Preparations of Cascara" (PROC. AMER. PHARM. Assoc., 1904).

Nelson extracted the drug with warm "absolute" alcohol, then with 75% and thereafter with diluted alcohol; from the mixed extracts the alcohol was recovered, and the residue well shaken with 20% alcohol and powdered pumice. The filtrate was precipitated with lead acetate, this precipitate washed and mixed with solution of sodium carbonate,the mixture filtered, the filtrate neutralized with acetic acid and evaporated on sand.

The fraction of the drug so obtained was regarded by Nelson as containing tannin; not, however, from evidence by any test that he applied, but partly by the inference that at this point "tannins, plant acids, glucosides, colors, etc." might be found, and mainly by the asumption that the purgative effect of this fraction "might have been enhanced by removing the tannins."

In making this statement, Nelson may have accepted the opinion of previous investigators, since he refers especially to the work of Dohme and Engelhardt, who seven years before had reported what they believed to be "a mixture of the lead salt of the glucoside with the lead salts of the tannates present."

The foregoing notes summarize the evidence which the literature of cascara sagrada contains to indicate by either direct statement or implication that tannin is a constituent of this drug. There is no record of any special attempt to isolate and purify any such substance, nor of any undertaking to examine the indication of its presence which ferric compounds give, and upon which behavior alone the affirmation of the presence of tannin seems to have been made.

It is a remarkably consistent observation by all who have sought the active principle, that this is fractioned into that part of the extractive which would also contain any tannin of conventional properties; but equally remarkable is the scant attention which this fact has received.

The bark which was used in the work about to be reported complied with official requirements including that of age; it had been collected nearly four years prior to this use of it.

When regarding a drug for tannin, a study of its decoction is always of interest, for this preparation offers opportunity to gather some of the early impressions with respect to the presence and amount of this constituent.

Decoctions of cascara sagrada have odor suggestive of the drug and very

faithfully represent its bitterness. The decoctions give blackish brown colors and brown precipitates with ferric chloride test solution, and almost identical behaviors with ferric acetate solutions.

Gelatin solution precipitates the decoctions; the stronger decoctions at once, and the weaker within a few minutes.

All decoctions of cascara sagrada are rendered cloudy by acidification with acetic, hydrochloric, oxalic or sulphuric acid; and if the decoction be first acidified with acetic acid and the mixture be allowed to stand until the precipitate has settled, the filtered liquid will give much less precipitate with gelatin and it will be of a much lighter color. In this acidified and filtered liquid, ferric chloride produces the characteristic blackish or dark brown color, without causing a precipitate.

The precipitation of extractive from the decoction by simple acidification is even more pronounced when hydrochloric acid is used and while ferric chloride continues to cause the blackish and dark brown colors, gelatin will not always give a precipitate.

The ten per cent decoction, allowed to cool and filtered clear, is brilliant and has a dark wine-red color. It is distinctly acid to litmus paper, and slowly produces effervescence with calcium carbonate. To circumvent any interference by free oxalic acid or acid oxalates of the ferric chloride test for tannin, some of the decoction was treated with an excess of calcium carbonate, and after several hours of contact was filtered and refiltered to obtain an entirely clear liquid. This specially prepared fluid gave with ferric chloride the same color and precipitate as were shown by the original decoction; it also precipitated with gelatin, and was still precipitable by acetic acid.

The effect of hide-powder on the ten per cent decoction was striking. Immediately, the greater part of the color was absorbed, causing the dark wine-red color to become of a brownish amber or diluted caramel color. After two hours contact, it was noted that approximately four-fifths of the color had been taken out of solution. There may be a selective withdrawal of the color, as simple dilution of the original decoction failed to match exactly the tint of the partly decolorized fluid. Some of the acidity of the decoction was absorbed by hide-powder, but there was little difference detectable in the element of bitterness.

In the hide-treated liquid there was less precipitate by ferric chloride, but still a production of the characteristic color, the blackish shade of which was now found to be more likely noticeable by reflected light; as transmitted light showed but dark-brown colors, without the peculiar feature of blackness.

The iron color-reacting factor is thereby shown to be non-absorbable by hide-powder. The clarity of the hide-treated liquid was not disturbed by acetic, hydrochloric or sulphuric acid. The mixture with the last named acid actively decolorized potassium permanganate.

Gelatin produced no precipitate in the hide-treated liquid, a behavior which shows that the iron color-reacting factor and the gelatin-precipitating property do not reside in one and the same constituent.

The Procter hide-powder method of estimating the "tanning value" of vegetable substances was applied to a ten per cent decoction with the resulting absorption of 2.28% of the bark represented. But, as is well known, these bare

figures mean nothing positive as to the presence of that amount of actual tannin, because this quantitative process is subject to variations which are greater than this amount, on account of irregular absorption of extractive matter by the hide.

An approximately saturated infusion of cascara sagrada prepared with cold water and carefully filtered is a brilliant liquid with deep wine-red color, pronounced acidity to litmus paper and intense bitterness. This clear liquid becomes cloudy upon simple dilution with water, either at once or very soon; it also clouds upon acidification with acetic acid, also by addition of gelatin, and even by mere warming.

As the process of dialysis also offers opportunity to observe the behavior of tannins and associated substances, some of the ten per cent decoction was placed on a parchment septum arranged so that the liquid within and the water without the membrane would maintain the same level.

Immediately an osmosis of color began, and from this first appearance of color in the outer liquid, the latter showed the characteristic color reaction with ferric chloride; but in this dilution gave no precipitate with gelatin. When, however, this slightly colored fluid, or a subsequently obtained one, was evaporated to a proportionately small bulk, as for instance to one-tenth of its volume, the color of the resulting liquid was much intensified, and the cold and filtered fluid not only gave a darker color and heavier precipitate with ferric chloride, but, also in the case of the first several lots of it, gave precipitates with gelatin. When finally gelatin ceased to give these precipitates, ferric chloride continued to produce the peculiar dark-brown color.

From this experiment, and, from the additional observation that the coloring which is not absorbed by hide is augmented by evaporation, it would seem that some part of the coloring is a result of change in, perhaps an oxidation of, a dialysable constituent originally present, or produced when the bark is brought into contact with water. Such may be a result, if not the usual understanding, of the changes sought through the aging of the bark.

None of the highly colored fluids obtained by evaporating the slightly colored watery dialysates could be rediluted with water or acidified with acetic acid without precipitation taking place. All of these concentrated solutions gave with potassium hydroxide solution the red color indicative of emodin.

After four days on the septum, with three changes of water daily in the outer vessel, the remaining liquid was filtered, as it now showed suspended matter. The filtered liquid was fluorescent, had an opalescent turbidity, was light brownish-yellow, and had an acid reaction to litmus paper and a bitter taste. It did not precipitate gelatin, but gave copious, flocculent or almost gelatinous precipitates with ferric chloride solution and with acids; but there was only the faintest indication of the color usually produced by ferric chloride, thus attesting the complete passage or change of the factor which causes the color reaction with ferric compounds. As this residual liquid gave a dark red color with potassium hydroxide solution, it very likely contained some emodin.

After these preliminary observations, several means for extracting and isolating tannin were tried. Ground drug (2.5 kilo.) was boiled for half an hour with each of three successive portions of water of double the weight of drug; the strained liquids mixed, evaporated to about the weight of the original drug, this solution

strained and allowed to become cold. When cold, this solution was again strained, then shaken with several successive portions of acetic ether (the ethyl acetate of the references made herein).

Upon separating this solvent and evaporating it under reduced pressure, it yielded a reddish residue, almost varnish-like, containing an abundance of minute crystals arranged in burr-like formation. While there was no manifestation of the presence of tannin by any appearance of this residue, due allowance was made for the presence of crystalline matter, which, as experience has taught, may militate against if not completely prevent the "puffing" of residues containing tannin when the solvent is removed in vacuo.

Ether applied to the residue removed at once the greater part of the red color, but a less considerable portion of the substance itself, giving a brilliant red solution. Subsequently applied portions of ether continued to remove yellow color and substance, and this treatment was repeated until the lemon color of the ethereal solution was apparently constant, for it failed to produce a sharp separation, although the substance producing the continuous color was but of trifling amount in the last washings.

When the red ethereal solution was evaporated, there was left a residue of reddish crystalline and granular substance, which imparted a yellowish or amber tinge to water; the solution so obtained gave the characteristic dark olive-brown color and some precipitate with ferric chloride, and a slight precipitate with gelatin solution upon standing for an hour.

The lemon-colored ethereal solution upon evaporation gave a similar residue, but with less red color, which in water solution had almost the same behavior toward ferric chloride, but did not show precipitation with gelatin even upon allowing the test to stand for an hour.

These crystalline and granular substances dissolved in weak solutions of potassium hydroxide with production of purplish-red or blood-red solutions, which gave flocculent orange-colored or yellowish precipitates when acidified.

That portion of the water extract which was removed by acetic ether and thereafter left undissolved by the several lots of ether, gave a porous residuum when dissolved in acetic ether and distilled *in vacuo* to remove this solvent. But neither the initial appearance of this residue on the wall of the flask as the solvent gradually evaporated nor the behavior of the last few drops as the solvent was finally dissipated conformed to the characteristic behaviors of tannins at these stages.

This residue was but sparingly soluble in water to which it imparted a yellowish color and a bitter taste. As further attempt at purification or separation, it was repeatedly treated with ether which removed small amounts of yellow matter, and with chloroform and benzol, both of which also dissolved from it some similar substance.

Between these treatments, the residue was rubbed with water and acetic ether, into which latter solvent it went with readiness and with but little diminution through any effect of the water. Upon separating and evaporating the acetic ether layer under reduced pressure, the porous resin-like substance was easily reobtained.

Several repetitions of these treatments made but little if any difference in either the appearance or behavior of the substance, but water triturated with the

substance differed from the decoction in that the water-soluble part did not cloud with gelatin solution (even upon standing and acidification with acetic acid) although it continued to give the characteristic color reaction with ferric chloride.

As the final product, the substance was obtained from acetic ether solution in the form of a light brown, porous mass which filled the flask through its spongy-appearing but really very fragile state. It was obtained in more of a puffed and glistening tannin-like appearance by moistening it with ether and rapidly evaporating the solvent *in vacuo*. (A specimen of each state was shown.)

To further examine the original decoction from which this substance had been obtained, by shaking with acetic ether, the aqueous layer from which the latter solvent was drawn off was now strongly acidified with acetic acid and agitated with additional lots of acetic ether. There was, however, but little more substance removed, and after the above-mentioned treatment it had the same properties as the porous resin-like product which has just been described.

Next the aqueous liquid remaining from the original decoction was mixed with another portion of acetic ether and thereafter saturated with sodium chloride; and again only a trace of material was removed, and after the described treatment resulted in the same product.

Another lot of the ground bark, 2 kilo., was percolated with acetic ether until exhausted of bitterness, by which time color and weighable extractive had been removed.

The solvent was recovered and the tarry-black mass treated with chloroform, which took away greasy material that was found to be almost insoluble in water, although this solvent carried into solution some of the substance giving the characteristic color reaction with ferric chloride; but the solution thus reacting did not show any tendency to precipitate with gelatin.

The chloroform-insoluble part of this acetic ether extract was examined in two ways. One half of it was treated with ether which dissolved much of the dark-colored substances, and, after repeated treatments with water and acetic ether, left a resin-like residue identical with that obtained by shaking the decoction with acetic ether and purifying as first described.

The other half was treated with water, the mixture filtered to remove the undissolved matter which appeared to be almost the entire substance. The clear golden-yellow filtrate was shaken with acetic ether. This solvent removed but a trifling amount of a yellow, viscid substance, which, judged by a control experiment made by evaporating some of the liquid, was the only matter in the water solution.

The golden-yellow filtrate gave the characteristic color reaction with ferric chloride, but no cloudiness with gelatin.

By treating with ether and thereafter with acetic ether in the presence of water; the resinous substance obtained from this half of the acetic ether extract of the drug resulted in a product like that first had from the decoction.

The amount of this final product of the acetic ether extraction of the drug was relatively much larger than that from the decoction.

Having noted that acetic acid caused precipitation in decoctions of cascara sagrada, a third portion of the ground drug, 1 kilo., was macerated with 6 per cent acetic acid for two days. A clear, dark wine-red liquid was then filtered off;

it reacted characteristically to ferric chloride and gave a precipitate with gelatin solution.

This acetic acid solution of the bark was shaken with acetic ether which removed but a small amount of substance, that, carried through the method of purification already described, yielded a trifling amount of the resinous product obtained from the other processes of extraction.

There was no evidence of phlobaphene nor of tendency toward formation of such substance anywhere in the foregoing attempts to isolate and purify any tannin constituent of the bark; but it was decided to learn what might be done toward obtaining this form of tannin from cascara sagrada by extracting with water in the presence of alkali.

Accordingly, an experiment was made by mixing ground bark with magnesium oxide and extracting with hot water after the manner prescribed for the preparation of aromatic fluidextract of cascara sagrada.

The alkaline extract so obtained from 1 kilo. of the drug was concentrated by evaporation to 1 litre, then nearly neutralized with hydrochloric acid and finally strongly acidified with acetic acid. The resulting turbid liquid was shaken with acetic ether, which removed a substance similar to that from the other methods of extraction, but in very small proportion.

In the course of this work, it was found that most water solutions of cascara sagrada that contain enough extractive to impart wine-red or reddish-amber colors give at once precipitates with gelatin solution; while those solutions with but amber or yellowish colors, that is without reddish tinge, if freed from turbidity, as by repeated filtration, give no precipitate, unless, on prolonged standing.

But this peculiarity of gelatin to combine or precipitate with extractive is by no means a recent observation, for such behavior was noted on the part of tanning materials, a century ago, by Sir Humphrey Davy and his contemporaries, who were seeking to put leather-making on a scientific basis.

The irregular behavior of gelatin that was observed in this work may possibly have been due to the presence of emodin in the water solutions along with other extractive matter from the drug through mutual interaction as solvents for each other; for, as pointed out by Jowett, "emodin, although insoluble in water, is soluble in the aqueous extract of the bark, and that it is extracted from such a solution only slowly and with difficulty by shaking with immiscible solvents such as benzene, ether or chloroform;" and he referred to this peculiar behavior of emodin as "a possible explanation of the results of previous observers."

Having so far failed to obtain a tannin by any of the foregoing methods of extraction, and having recognized the reason for the irregularity of the gelatin test, the reference to the presence of "tannin" by Dohme and Engelhardt was next considered. While their mention of "tannin" was but casual in connection with their pursuit of the active principle, it is, nevertheless, next to the statement of Prescott, the most specific of those in the literature of the drug.

They proceeded as follows as quoted from their report: "The drug was extracted with chloroform to remove fats, etc., and the residue extracted with 80 per cent alcohol and the resulting extract dried and dissolved in hot water. On cooling, some resinous, waxy substance separated and was filtered off. The filtrate was treated with lead acetate, which produced a yellow precipitate. This

was filtered off and stirred with hot water on a water-bath. As the lead tannates are difficultly decomposable by H_2S it is advisable to pass this gas through the suspended precipitate of lead salts at a temperature of about 100° C. This was done until on shaking the flask, whose mouth was closed by the thumb, the latter was raised by the pressure of the gas. The PbS was filtered off and the filtrate evaporated to dryness, resulting in a dark brown substance which consisted mainly of tannins, as portions of them dissolved in water gave good inks on treatment with ferric salts. This tannate mass appears to be composed of several tannins which we did not undertake to investigate."

Operating on 900 grams of the finely ground drug, their procedure was repeated in every detail, except that of closing the flask with the thumb, instead of which the contents of the flask were constantly stirred with the glass tube through which the H_2S was passing, and this treatment was continued on a boiling water-bath until long after complete decomposition of the lead-cascara precipitate had been shown by every indication of change and final constancy in appearance, as well as by a superabundance of hydrogen sulphide.

The chloroformic extract was a dark greenish brown semi-solid mass. Water applied to it acquired only a slight greenish yellow tint. This solution was acid to litmus, gave no precipitate with gelatin nor lead acetate, and only a faint greenish color with ferric chloride.

The 80 per cent alcohol removed all bitterness from the drug, but not all of the iron and gelatin-reacting substances as will hereinafter be mentioned in detail. This alcoholic extract amounted to about one-fourth of the weight of the drug.

The turbid mixture of the water-soluble part of the alcoholic extract with the comparatively small amount of undissolved matter was treated with a slight excess of lead acetate solution, which made an olive-green precipitate. Upon filtration, the fluid part was obtained clear, where before the addition of the lead salt the turbidity was not easily removable by filtration. The clear filtrate had a dark wine-red color. The lead precipitate was washed by suspension in two successive portions of water, which upon decantation were added to the original filtrate to obviate any loss of the principle being sought. The lead precipitate was then decomposed with H_2S, as explained, the lead sulphide filtered off, and the wine-red liquid evaporated to a syrupy consistence, which on cooling became a semi-solid mass with the characteristic color of cascara extract. This residue was but partly soluble in acetic ether, which removed from it a resin-like substance similar to that obtained as the end-product of the several methods previously tried.

Rubbed with acetic ether and water, most of the residue which was not dissolved by acetic ether alone passed into solution; the much smaller undissolved portion was soluble in alcohol. When the acetic ether layer was separated and this solvent recovered, the familiar resin-like substance was again had.

The dark wine-red filtrate from the precipitate caused by lead acetate in the water solution of the 80 per cent alcohol extract was treated with lead subacetate solution which gave a salmon-colored to carrot-colored precipitate which settled out much more quickly than did the precipitate caused by lead acetate. The precipitates by both the lead acetate and subacetate were soluble in acetic acid. The filtrate from the lead subacetate precipitate had a reddish amber

color and gave additional precipitate when partly neutralized with potassium hydroxide. And even after removal of this last-named precipitate, the filtrate gave the characteristic reaction with ferric chloride.

The precipitate made by lead subacetate was more easily washed, and when suspended and decomposed by H_2S gave a brilliant dark-amber solution.

Upon evaporation of the filtrates from the lead sulphide precipitates, there was found to be little apparent difference in the solid extracts thus obtained from the lead acetate and subacetate precipitations; although a much larger proportion of that from the use of the subacetate redissolved upon addition of water.

The water solutions representing both lead precipitates, both in the original unevaporated and in the solutions obtained by redissolving the solid extracts, gave the characteristic reaction with ferric chloride and precipitated gelatin solution; but while acetic ether removed from these solutions the substance which gave the reaction with ferric chloride, it did not carry with this behavior the ability to precipitate gelatin.

The reaction obtained with ferric chloride was, in the case of the substances from both lead precipitates, the production of a brownish precipitate in dark olive-brown liquids; and although there was in some instances a suggestion of blackness when the test was viewed by reflection, still there was never observed a single reaction that showed by transmission the black, blue or green shades usually associated with reactions for tannin. While we have worked with tannins which were difficult to purify, and which continued to give variations in browns from the mentioned usually accepted colors (*Am. J. Pharm.*, p. 313 (1896)), we have always found these substances to give precipitates with gelatin.

It will be seen by the foregoing notes that we have not been able to confirm the presence of a tannin by following the procedure of Dohme and Engelhardt. And it is noteworthy that Jowett also secured "dark-brown" colors with ferric chloride from the materials which he regenerated from the lead acetate and lead subacetate precipitates obtained from comparable material.

The drug which had been exhausted with chloroform and 80 per cent alcohol, when freed from this solvent and boiled with water yielded a dark wine-red solution that gave the characteristic color with ferric chloride and some turbidity with gelatin, but here again extraction by acetic ether and purification by repeated solution in it brought about a separation of the two reactions, and resulted in a small yield of the resin-like substance which has been uniformly the ultimate product of our attempts to extract a tannin from cascara sagrada.

The bark used by Dohme and Engelhardt was described by them as "a typical specimen." It was less than one year old. But Jowett stated, as the result of his work, that "no difference could be observed between the chemical characteristics of the fresh (one year old) or of the so-called matured bark (3 years old)."

This final product, evidently a mixture, and referred to as resinous or resin-like merely as means of mention and without thought of classing it, seems to be the factor that at every point gives what has been described as the characteristic reaction with iron salts, which effect has been interpreted by some investigators as evidence of tannin.

This substance was soluble in alcohol, with production of an amber or yellow

solution, which withstood dilution with water in all proportions. The alcoholic and dilute alcoholic solutions gave the peculiar color reaction and precipitate with ferric chloride and a deep flesh-colored precipitate with lead acetate. Acetic acid dissolved the substance to make a yellow solution which was immediately precipitated upon dilution with water. Acetone and acetic ether dissolved it with deep wine-red colors. It was largely soluble in glycerin, but this solution was precipitated by addition of water.

From the yellow-tinged water solution of this substance, hide-powder did not absorb either this color or the property of reacting characteristically with ferric chloride.

Furthermore, when subjected to dialysis the saturated water solution of this final substance gave a dialysate similar to that from the decoction, in so far as the reaction with ferric chloride is concerned, but differed in behavior toward gelatin, for the evaporated liquid, although it developed an intensified color through concentration, did not show precipitation with gelatin; again showing that the iron color-reacting and gelatin precipitating effects do not reside in the same substance.

The outcome of this work has been to find that the substance or mixture which gives the reaction with ferric compounds is (1) non-absorbable by hide powder, (2) that it is dialysable through parchment and (3) that its saturated water-solution does not precipitate gelatin.

In view of these attributes, so distinctly negative for tannins, and of the explanation for the irregular behavior of the gelatin test, it seems conclusive that *cascara sagrada does not contain a tannin.*

A CONVENIENT APPARATUS FOR BLOOD COUNTING.

BY E. R. SERLES.

Everyone who has been in a clinical laboratory has at some time or other been called upon to make a blood count. Under the old method of filling the pipettes by means of the rubber tube and human lung power, many difficulties are encountered. The novice finds it very difficult to watch the tiny column of blood rise to 05 and at the same time hold the rubber tube so that there are no kinks which will cause him trouble when he places his tongue on the opening in the mouth piece.

In order to eliminate the difficulty mentioned above, the author substituted for the lung power a 2-cc. hypodermic syringe and shortened the rubber tube to about one inch. This worked much better, but the flexibility of the rubber tube still caused slight changes in the length of the air column above the blood and gave rise to errors when the pipette was carried from the blood droplet to the diluting fluid.

The new apparatus, which consists of an ordinary haemacytometer pipette with the top end reinforced and ground to fit the nozzle end of a 2-cc. Luer syringe, makes an ideal piece of equipment.

In order to insure perfect connection, the nozzle of the syringe barrel A may be coated with a film of castor oil. This not only insures a close fit of the two parts, but it allows for the easy removal of the syringe when you wish to transfer it to other

pipettes. A drop of oil on the plunger of the syringe facilitates the operation of that portion of the apparatus.

The advantages noted in using the above apparatus are as follows:

The operator may take up the blood column with one hand, since a slight raising of the plunger by the thumb and forefinger is sufficient to fill the pipette to 05. The other hand is free to use as occasion arises.

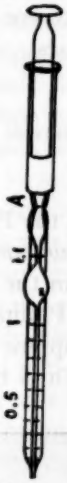

Fig. 1.

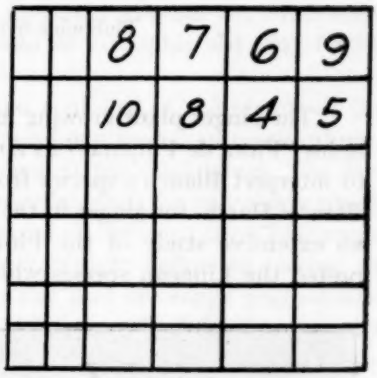

Fig. 2.

Second, the eye may be placed on a level with the graduations on the pipette.

Third, the column remains fixed unless the plunger is moved and if the plunger is covered with castor oil, accidents rarely occur.

Fourth, as soon as sufficient diluting fluid has been drawn into the bulb of the pipette, the apparatus may be rested in the hollow between the thumb and forefinger of the left hand and rotated with the right as you would roll a pencil between your thumb and fingers.

Fifth, the syringe attachment facilitates the washing of the pipettes in the various solutions when through using them.

Sixth, one syringe may be used for as many pipettes as desired. However, one for red and one for white cells is more convenient.

The author likewise uses another simple device which was designed by a former associate, Dr. R. C. Sherwood.

The above consists of a rubber stamp which is a replica of $^1/_{16}$ the counting field of the slide.

This enables the operator to systematically record his count.

The pipettes were ground by Central Scientific Company, Chicago, Ill. The rubber stamp was manufactured at the Northwestern Stamp Works, St. Paul, Minn.

AMERICAN BUSINESS.

"He would be a rash man who would state that we are finally upon the golden stairs to the industrial millennium, but there is great hope that America is finding herself upon the road to a solution of the greatest of all her problems. That is, the method by which social satisfaction is to be attained with the preservation of private industry, initiative and a full opportunity for the development of the individual."—Secretary Herbert Hoover.

ROMANCE IN BUSINESS.

Every art and profession has its romances and these interest the public if told in words understood by the lay reader. This comment is prompted by a book recently published by Captain Mallet "Plain Tales from the Far North," which brings out the romance in fur trade, even though important matters of the business are not discussed in detail. The story portrays the points of contact and human nature and is rich in imaginative appeal. The specific purpose of the comment is to emphasize again the importance of the book on pharmacy, to be written in popular style, the preparation of which will receive further consideration at the Philadelphia meeting; editorial mention has been made in previous issues of the JOURNAL.

PHILIPPINE GINGER.*

BY PATROCINIO VALENZUELA.

Zingiber officinale Roscoe = *Amomum Zingiber* Linn.
Zingiber zingiber Karst. = *Zingiber Blancoi* Hassk.

Philippine Synonyms: *Luya*—Tagalog. *Laya*—Bicol. *Baseng*—Ilocano. *Layal*—Zambales, Ilocano.

The ginger plant growing in the Philippines has been identified by Blanco (1) in his "Flora de Filipinas" as *Amomum zingiber* Linn. Hasskarl (2) in attempting to interpret Blanco's species from the description, proposed the name of *Zingiber Blancoi* Hassk. for ginger in the Philippines. Merrill (3), however, who has made an extensive study of the Philippine flora verified that Blanco correctly interpreted the Linnean species which is the same as *Zingiber officinale* Roscoe. According to Merrill, Blanco's description typifies *Zingiber Blancoi* Hassk. He (4) also believes that ginger in the Philippines has originated either from the Orient or Europe and was purposely introduced into the archipelago for its use as condiment. Thus he includes ginger among the different species which have been introduced by men either in prehistoric or within historic times.

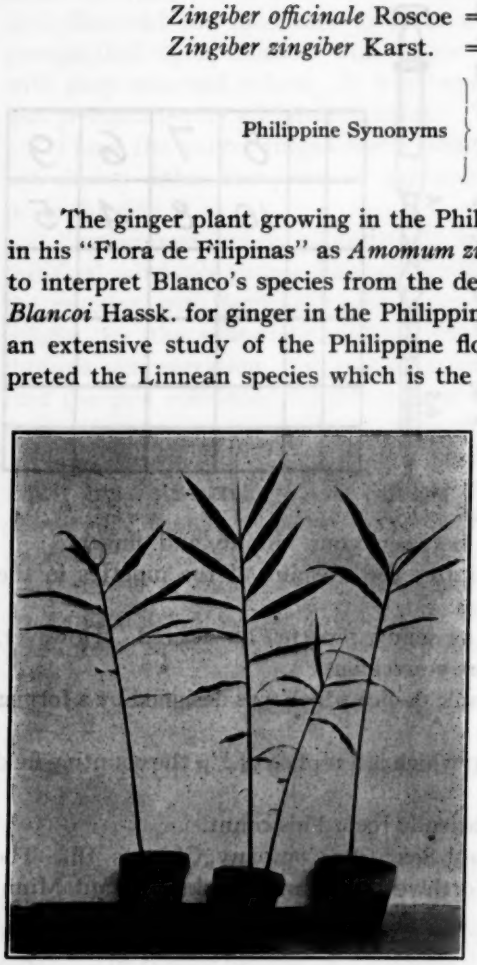

Fig. 1.—Plants raised in the green house of the Biology Bldg. from rhizomes of Lot III.

The plant abounds in all parts of the islands and is found cultivated by the natives in small patches for local demand. Its rhizome is very much used as a condiment in several native dishes, so much so that it is easily obtained in the city as well as the town markets. However, it is not cultivated on a large scale either for export purposes or for home consumption as a drug.

A decoction of ginger flavored with brown sugar is very commonly prepared as a drink. It is known by the name, *Tahû* as called by the Chinese. This is considered as an excellent aromatic, tonic, stomachic and stimulant and Pardo de Tavera (5) believes that it would probably be highly useful as well as economical as a part of the ration of European and native troops in the field. He also states that hot *Tahû* is an active diuretic and during the cholera epidemic in Manila some physicians used it with very satisfactory results.

Statistics regarding the importation of the drug ginger into the Philippines

* Part of a thesis submitted for the Degree of Doctor of Philosophy, Pharmacy as major, at the University of Wisconsin, June 1926.

are not available. According to the Director[1] of the Bureau of Commerce and Industry of the Philippine Islands, ginger is regularly imported from China (6).

Inasmuch as ginger is a drug of importance, not only in the Philippines but through the world, being official in all the editions of all national pharmacopœias, except the second edition of "Pharmacopœia Austriaca" the "Ph. Romana," the fourth edition of "Farmacopea Ufficiale del Regno d'Italia," and the "Ph. Serbica," this study is, therefore, undertaken to ascertain whether the cultivation and preparation of ginger in the Philippines would be advisable not only for its consumption as a condiment but as a drug as well.

Although a voluminous bibliography has been compiled in the review of the literature of ginger at large, yet very little, it was found, has been done on the phytochemical study of the rhizome of the plant grown in the Philippines. So far, Bacon's work (7) on the Philippine terpenes and essential oils is the only study which is recorded in the literature that includes the essential oil obtained from Philippine ginger. He reported that a yield of 0.072 per cent of light yellow oil having an odor of ginger and also a strong odor very much like that of orange peel oil was distilled by him. Lately a report of the Bureau of Science (8) of the Government of the Philippine Islands, gave the following results for the analysis of Philippine ginger:

	I ("Larger variety").	II ("Finer variety").
Ash	7.9 per cent	5.4 per cent
Alcohol extract	7.02 per cent	8.50 per cent
Ether extract	5.98 per cent	5.99 per cent

Adriano and Tavanlar (9) in their recent study of the calcium oxide content of some Philippine foods, reported 70.18 per cent moisture, 1.22 per cent ash, 1.27 per cent CaO in ash corresponding to 0.05 per cent in the dried material and to 0.026 per cent in the material containing 70 per cent of moisture.

Wells (10) has pointed out the commercial possibility of ginger cultivation in the Islands.

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(1) "Flora de Filipinas. Segun el Sistema sexual de Linneo." Por el P. Fr. Manuel Blanco, Agustino Calzado, 1837. (E. D. Merrill, *Species Blancoanae* p. 7 (1918).)

(2) M. Blanco, "Flora de Filipinas," übersetzt und kritisch beleutet von J. K. Hasskarl. (E. D. Merrill, *Species Blancoanae* p. 22 (1918).)

(3) *Ibidem*, p. 110.

(4) E. D. Merrill, "Notes on the Flora of Manila with special reference to the introduced element," *Philippine J. Sci.*, 7C, 192 (1912).

(5) T. H. Pardo de Tavera, "The Medicinal Plants of the Philippines" (1892), Trans. by J. B. Thomas p. 228 (1901).

(6) Correspondence from Director Reyes of the Bureau of Commerce and Industry, Manila, October 12, 1925.

(7) R. F. Bacon, "Philippine Terpenes and Essential Oils," *Philippine J. Sci.*, 5A, 259 (1910).

(8) *Loc. cit.*

(9) F. T. Adriano and E. J. Tavanlar, *Philippine Agr.*, 14, 347 (1925).

(10) A. H. Wells, Unpublished article read at the Chemistry Section of the Second Philippine Pharmaceutical Convention, Manila, 1923.

HISTOLOGICAL STUDY.

The cross sections of the freshly dug rhizomes of Philippine ginger cultivated

[1] Thanks are due to Director Reyes who has kindly given this and other information.

in the biological green-house were examined. A study of the sections did not reveal any difference in the anatomical structures as compared with the descriptions and illustrations in literature. (1)

The possible localization of the pungent principles, at least of zingerone in the various sections, was tried by means of Millon's reaction. The sections were colored as observed in the microscopical test with Millon's reagent, but closer microscopical examination of the colored portions under high power revealed that the portions intensely colored are the cell walls of the vessels. In view of the doubtful occurrence of the principles in these portions of the tissues, further study was not made.

Philippine ginger—Zingiber officinale Roscoe.

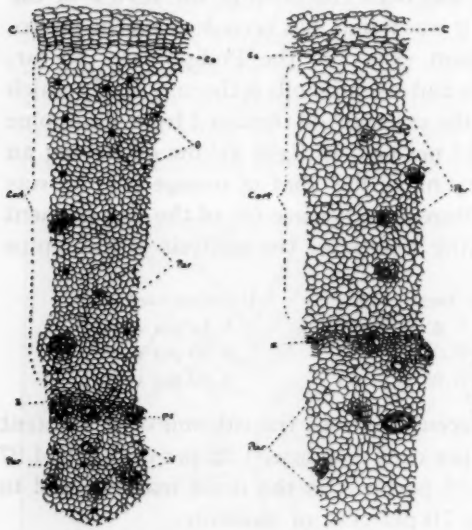

Fig. 2.

Fig. 2.—Cross section of fresh rhizome. *C*—cork; *Cc*—cork cambium; *O*—oil cells; *Cort*—cortex; *E*—endodermis; *V*—vessels; *Par*—parenchyma; *Pc*—pericycle.

Fig. 3.

Fig. 3.—Cross section of young rhizome. *C*—cork; *Cc*—cork cambium; *Cort*—cortex; *Par*—parenchyma; *E*—endodermis.

Philippine ginger—Zingiber officinale Roscoe.

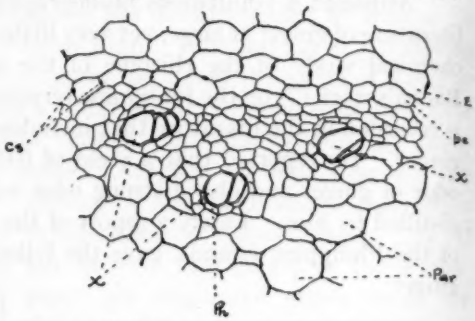

Fig. 4.—Endodermal region from a cross section of young rhizome. *E*—endodermis; *Cs*—casparian strips; *Pc*—pericycle; *X*—xylem; *Ph*—phloem; *Par*—parenchyma.

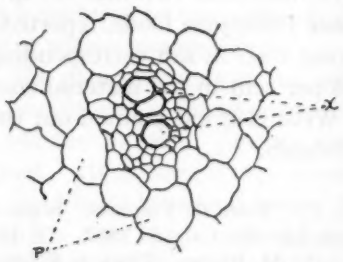

Fig. 5.—Fibrovascular bundle from a cross-section of young rhizome. *X*—xylem; *P*—parenchyma.

Microscopical study of the anatomical structure of the rhizomes was made from several cross and longitudinal sections of both old and young rhizomes. These sections were permanently mounted by means of the paraffin method according to the schedule of Prof. Kraus. (2) Portions of the freshly dug rhizomes from the green-house were placed in solutions enumerated below for the specified time.

70 per cent alcohol	12 hours	$^1/_3$ alcohol $^2/_3$ chloroform	12 hours
85 per cent alcohol	12 hours	Chloroform	12 hours
95 per cent alcohol	12 hours	Chloroform and parowax	Cold
Absolute alcohol	12 hours	On oven	6 to 12 hours
$^2/_3$ alcohol $^1/_3$ chloroform	12 hours	In oven	12 hours

Parawax renewed several times until free from chloroform.

After the rhizomes had undergone the above treatment, they were imbedded in paraffin and blocked. Several sections (longitudinal and cross) were made and fastened on slides by means of Mayer's Fixative.

STAINING OF THE SECTIONS.

The removal of the paraffin was accomplished by immersing the slides several times in xylene for a few minutes after which the sections were dried by repeated immersion in absolute alcohol.

From this dehydrating agent, the slides were transferred to safranin and left in this staining solution over night. After the safranin treatment they were washed with water, immersed quickly and for a very short time in acid solution, then in alcohol and xylene. They were then stained with gentian violet, in the solution of which, the slides were left from 3 to 4 hours and permanently mounted with Canada balsam. Different shades of the stain were obtained by changing the length of time in the staining and washing processes.

The various sections drawn from the selected slides are shown in Figs. 2 to 8.

HISTOLOGY.

The various tissues of the whole rhizome consist mainly of (1) epidermis, (2) cork, (3) cortex, (4) endodermis, (5) fibrovascular bundles, (6) oil secretion cells and (7) parenchyma.

1. *Epidermis.*—This is shown in the young rhizomes. It was absent in the sections from the old rhizomes, presumably destroyed by secondary growth. It consists of a layer of flattened thick-walled cells somewhat smaller than the cork cells. Under the epidermis are a few layers of parenchyma cells.

2. *Cork.*—It consists of slightly flattened, thin-walled cells extending radially towards the epidermal region. Figs. 2 and 3 show the cork including cork cambium.

3. *Cortex.*—This consists of a layer of cells chiefly of parenchyma. Numerous oil secretion cells and fibrovascular bundles are distributed throughout the cortex. It is narrow as compared with the steele. According to Tschirch and Oesterle (3), the narrowness of the cortex and the relative number of fibrovascular bundles are rather characteristic of ginger. Figures 2 and 3 show the cortex (cort.) with the oil cells (*o*) fibrovascular bundles and parenchyma (*p*). The parenchyma cells are similar to those in the steele, those occurring in the middle portions of the cortex being relatively larger than those nearer the endodermis and cork. They are much larger than those of the other tissues.

4. *Endodermis.*—The rather thin-walled cells are elongated, somewhat elliptical and very much smaller than the neighboring parenchyma of the cortex. The end walls of the endodermis show very clearly in cross-section small glistening pinkish dots known as the Casparian dots, or Casparian strips (4). See Figs. 4, 6 and 7. The endodermal cells do not contain starch grains. The pericycle (*Pc*) is found below the endodermis. It consists of cells resembling those of the endodermis except that there are no Casparian strips and its cells appear to be living.

5. *Fibrovascular Bundles.*—Although scattered throughout the cortex and the steele, they are especially numerous under the endodermis. The vessels are broad,

with reticulated thickenings occurring mostly 2 or 3 in each bundle. They are accompanied by long and broad fibers. Companion cells are also found with the vessels.

Philippine ginger—Zingiber officinale Roscoe

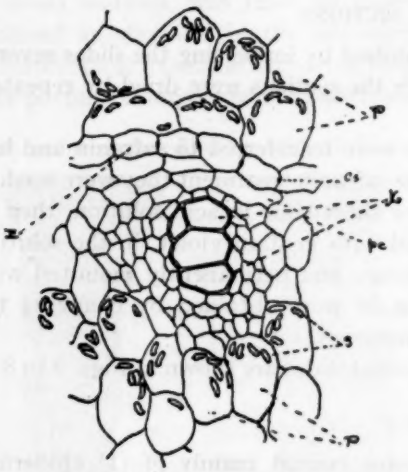

Fig. 6.—Endodermal region from a cross section of old rhizome. *E*—endodermis; *X*—xylem; *P*—parenchyma; *S*—starch granules; *Cs*—casparian strips; *Pc*—pericycle.

Philippine ginger—Zingiber officinale Roscoe.

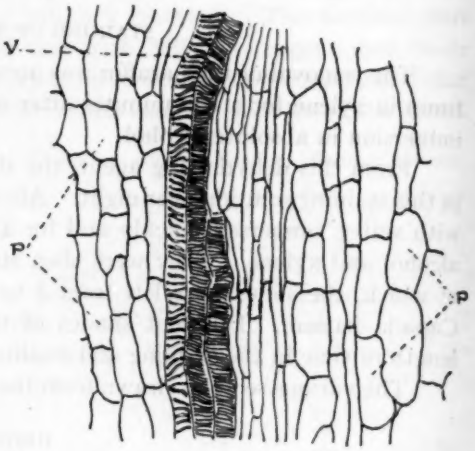

Fig. 8.—From a longitudinal section of old rhizome *V*—vessels; *P*—parenchyma.

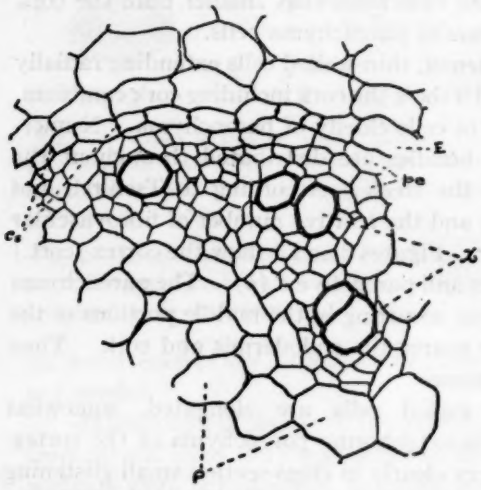

Fig. 7.—Endodermal region from a cross-section of young rhizome. *E*—endodermis; *X*—xylem; *P*—parenchyma; *Cs*—casparian strips; *Pc*—pericycle.

Fig. 9.—*A*.—A cross-section of rhizome treated with guaiac and H_2O_2, natural size. *B*.—Section untreated, natural size.

Fig. 10.—*A*.—A cross-section of a root treated with guaiac only, natural size. *B*.—Section untreated, natural size.

6. *Oil Secretion Cells*.—These cells are slightly smaller than the average parenchyma cells. They contain a yellowish green oil. Their occurrence in the section is indicated in Fig. 2, drawn from a cross-section of fresh rhizome.

7. *Parenchyma.*—This forms the largest part of both cortex and steele. The cells are thin-walled and much larger than the other cells. In the cortex, as already mentioned above, the middle parenchyma consists of relatively larger cells. In the old or mature rhizomes (see Fig. 6) the parenchyma cells contain numerous starch grains. The starch grains are hardly differentiated from those occurring in other varieties of ginger. They are simple, flattened, somewhat elongated and ovate with tapering point at one end. The hilum is hardly distinguishable.

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(2) The writer gratefully acknowledges the kind suggestions of Prof. E. J. Kraus of the Botany Department, under whose directions this part of the work was undertaken.

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PHYTOCHEMICAL STUDY.

Material. I.—The preliminary work was conducted with material obtained in a fresh state by parcel post from Manila through the kindness of the Director of the School of Pharmacy of the University of Philippines. Whereas some of the rhizomes had become soft due to partial rotting, a number of them were quite firm and showed no indications whatever of decay. Inasmuch as the shipment required about a month, the antiseptic qualities of some of the constituents must be truly remarkable.

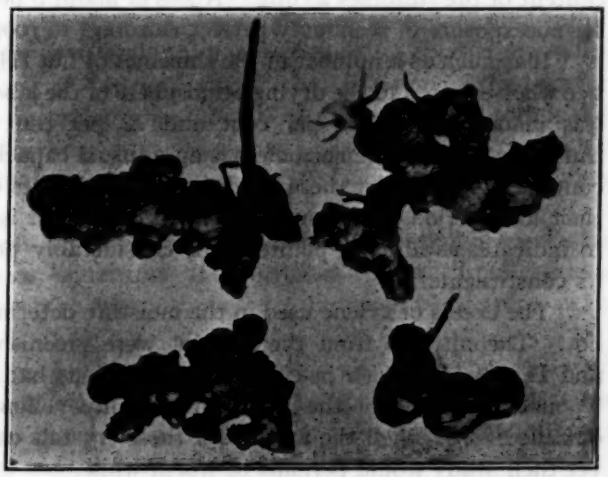

Fig. 11.—Rhizomes from plants (Fig. 1) one month after the overgrown portions had died off. (Lot III.)

II.—A second lot was obtained from the University of the Philippines through the Bureau of Supplies of the Government of the Philippine Islands. In two large cases this material was shipped from Manila December 11, 1924, and received at Seattle, January 14, 1925. Owing to government red tape, the cases were not delivered at Madison until April 2, 1925. As can be imagined, some of this material had softened and showed other signs of decay. The bulk of this material, however, was subjected to extraction with alcohol.

III.—Because of the delay in the shipment of the second lot, a third but much smaller lot was purchased in the Divisoria Market in Manila by Mrs. E. C. Valen-

zuela and brought by her with the least possible delay to Madison. It arrived in perfect condition.

Moisture Determination.—The xylene method was employed,[1] 10 grams of thinly sliced rhizome and 100 to 150 cc. of xylene being used for each determination.

I.—86.50 per cent and 85.00 per cent, respectively, of moisture were found. The filtrate of the residual xylene was yellow.

II.—Owing to the unsatisfactory condition in which this material arrived a number of determinations were made, yielding, as might be expected, more or less divergent results, *viz.* 80.0, 87.0, 79.0, 84.5, 87.0, 86.0, 82.0, 87.0, 85.0, 82.0 per cent or an average of 83.95 per cent.

III.—Three determinations yielded 75 per cent, 78 per cent, and 73 per cent respectively, or an average of 75 per cent.

After two days, during which the unpacked rhizomes were exposed to room temperature, three additional determinations were made yielding 70 per cent, 70 per cent and 69.5 per cent respectively, an average of practically 70 per cent. This is also in agreement with the results of the three analyses of Adriano and Tavanlar (*loc. cit.*).

A comparison of the averages of the three Lots, *viz.*, 85.8 per cent for the first, 83.9 per cent for the second, and 75.0 per cent for the third, would seem to indicate that the partial decay of some of the rhizomes in closed packages during shipment was the cause of the high moisture content of Lots I and II. Hence, 75 per cent may be assumed, for the present at least, as coming nearer the normal moisture content of the rhizomes as dug. A loss of about 5 per cent of moisture is recorded for an exposure of seemingly perfect rhizomes to room temperature for 2 days.

Inasmuch as a number of the rhizomes of Lot III produced buds of appreciable size when exposed to the drying atmosphere of the laboratory, a third determination was made. Sixty-nine per cent and 72 per cent respectively were obtained, thus showing that the rhizome has an unusual capacity for holding on to its water content. That under these conditions the rhizomes did not rot completely during their long period of shipment in closed containers is remarkable and would seem to indicate, as already pointed out, considerably preservative power of some of its constituents.

The excess of xylene used in the moisture determinations was filtered off while hot. The filtrates from the last lot were greenish, whereas those from Lots I and II were yellowish in color. The solutions had the pungent taste of ginger. Upon evaporation of the hydrocarbon, tiny yellowish needle-like crystals were obtained. Although the amount of these crystals was too small for further work, yet their study would perhaps be worth while.

Ash Determination.—The following results were obtained:

Lot I.	I.	II.
Total ash	11.97 per cent	11.88 per cent
Insoluble ash	5.42 per cent	5.48 per cent
	6.55 per cent	6.40 per cent
Lot II.	**I.**	**II.**
Total ash	5.67 per cent	5.87 per cent
Insoluble ash	1.68 per cent	1.93 per cent
	3.99 per cent	3.94 per cent

[1] *Circ.* 134, U. S. Dept. Agri. (1908).

In Lot I the ash had a greenish color. In the case of the Lot III, the ash had also a greenish color, although not to the extent of imparting this tint to the solutions of soluble ash as had been observed in the ash determination of Lot I.

The high percentage of all three kinds of ash in the Lot I is noteworthy. The yield, however, of the ash in the Lot III was not as high. It is within the pharmacopœial requirements as well as within the average yield of ash of good samples of ginger obtained in the market. The unusually high percentage of ash in the Lot I cannot be explained.

Oxidase Test.—Qualitative tests for oxidase with the aid of tincture of guaiac were tried on freshly cut rhizomes of Lot III. Practically no change in color was observed. However, a positive test was obtained later with material that had been kept under green-house conditions. Apparently the oxidase had been destroyed during transportation.

Microscopical and Macroscopical Color Tests.—In studying the properties of zingerone, Nomura[1] found that it gives a red coloration with Millon's reagent, dissolves to a green-colored solution with alcoholic ferric chloride, and reduces ammoniacal silver nitrate solutions on warming. Apparently this behavior is due to the phenolic character of zingerone. Based upon these color reactions of zingerone, the possibility of testing sections of ginger rhizomes with these reagents was tried. Thus, sections of the rhizomes of Lot III were tested with Millon's reagent and alcoholic ferric chloride. The sections immediately acquired a pinkish coloration throughout. A more intense coloration was found around the endodermal region, especially the cells around the vessels near the endodermis. Very slight greenish coloration was observed in case of ferric chloride. The tests were carried further macroscopically by placing the dried rhizome in fine powder in a porcelain test tablet and testing with the same reagents used above. The pink coloration caused by Millon's reagent was again observed. In case of ferric chloride, the change was not so decisive.

Moisture and Ash Contents of Fresh Rhizomes.—Since a variation of results has been observed in the moisture content of the rhizomes shipped from Manila, analyses were made of the recently dug rhizome from the ginger plant grown in the green-house.

Material.—The rhizome used was the one yielded by the plant after the overground stems had withered and which remained in the pot one month after the withering of the stems. This rhizome was thoroughly washed and then allowed to dry spontaneously at room temperature.

Moisture Determination.—The xylene method was employed. Ten grams of thinly sliced rhizome and 150 cc. of xylene were used for each determination. Seventy-nine and one-half per cent and 80.00 per cent, respectively, were obtained in two determinations.

The excess of xylene was filtered while hot. The filtrate was greenish, pungent and after evaporation of the hydrocarbon yielded 0.198 per cent and 0.200 per cent of yellowish residue with tiny needle-like crystals.

The average moisture content of 79.75 per cent obtained from the fresh rhizome may be considered as its normal water content. Thus, referring back to the per-

[1] *J. Chem. Soc. Trans.*, 111, 771 (1917).

centages of moisture, yielded by the first and second lots shipped from Manila *viz.* 85.8 per cent and 83.9 per cent, the present results from the fresh rhizome corroborate the assumption that the excess of water might have been due to partial decay.

Ash Determination.—The ash content of the rhizome obtained from the same plant referred to above is as follows:

	I.	II.
Total ash	6.29 per cent	6.10 per cent
Insoluble ash	2.30 per cent	2.40 per cent
	3.99 per cent	3.70 per cent

Oxidase Test.—The test for oxidase[1] was made on the fresh rhizome and root immediately after these had been dug and thoroughly washed. The surface of the fresh sections was covered with a recently made and weak solution of guaiac resin in absolute alcohol. After a short while the rhizomes became decidedly blue, the color being more intense in the cortical region. The coloration started first near the periderm and then continued to spread throughout the section. The addition of a drop of hydrogen peroxide caused the color to become more intense.

Similar tests were made on sections of the root. Positive results were also obtained, the blue color being very intense at the pith which, when cut, exudes milky juice.

Pungency.—The rhizomes used in this experiment were those of the third lot which had been allowed to stand in the laboratory for thirty-five days. Four different samples were prepared from these rhizomes. 1. Peridermal portion. This constitutes the peelings (periderm) of the rhizomes which was carefully removed. 2. Cortical portion. This consists of that portion of the cortex which was carefully scraped from the parenchymal part. 3. Parenchymal portion. This is the remaining part of the rhizomes left after the removal of the periderm and the cortex. 4. Entire rhizome. All materials were dried at room temperature (the entire rhizome being previously sliced) for six days and reduced to a No. 20 powder.

Solutions having different dilutions were made from each of these four samples and the pungency was physiologically tested according to the modified Scoville method.[2] The observations were made by ten persons to eliminate personal equations as far as possible.

The results reveal that the cortex is the most pungent whereas the parenchyma is the least pungent.

Thus the physiological tests corroborate the microchemical tests. If in this connection it be remembered that oil cells are also found in the cortical layer, the effects of the practice of pealing the rhizome will be readily understood.

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[1] W. C. Stevens, "Plant Anatomy," 4th ed., p. 360 (1924).

[2] A one per cent alcoholic solution is prepared by boiling 1 gram of drug with alcohol for half an hour. The cooled filtrate is diluted to 100 cc. To measured amounts of this solution 2 drops of 5 per cent sodium hydroxide solution are added and diluted with water to 100 cc. Of this aqueous solution 1 cc. is held in the mouth for 15 seconds. An unmistakable warmth denotes the limit of dilution. Double this strength causes a distinct burning of the mouth lasting for several seconds.

The results obtained follow.

Subjects.	Limit of pungency of different samples. Peridermal.	Cortical.	Parenchymal.	Whole.
1. P. V.	1:3000	1:3000	1:3000	1:3000
2. A. U.	1:5000	1:5000	1:3000	1:3000
3. W. J. M.	1:3000	1:2500	1:2500	1:2500
4. S. S. C.	1:3000	1:3000	1:3000	1:3000
5. E. C. V.	1:3000	1:3000	1:2500	1:3000
6. T. F.	1:3000	1:5000	1:3000	1:2500
7. A. B. G.	1:3000	1:5000	1:2500	1:2500
8. S. M.	1:3000	1:5000	1:3000	1:2500
9. L. R. K.	1:3000	1:5000	1:3000	1:3000
10. P. A. H.	1:3000	1:3000	1:3000	1:2500

The above results may be summarized as follows:

No. of persons.	Limit of pungency.	Material tested.
9	1:3000	Periderm
1	1:5000	
5	1:5000	Cortex
4	1:3000	
1	1:2500	
7	1:3000	Parenchyma
3	1:2500	
5	1:3000	Entire rhizome
5	1:2500	

(*To Be Continued*)

PRESCRIPTION LIBRARIES FOR COLLEGES.

Herbert R. Speckart, of St. Louis, has made a suggestion relative to the preservation of prescription files and utilizing them in pharmacy schools. The idea is that stores discontinuing business donate their prescription files to colleges, after removing the names thereon of patients and physicians. This involves considerable labor, but without doing so there would be complaint because of possible misuse. In most instances prescription files are transferred to other stores; however old files are to be had, which reminds us that during the 50th anniversary of the AMERICAN PHARMACEUTICAL ASSOCIATION, several members were fortunate in obtaining many old prescriptions that had been compounded by the "Father of American Pharmacy," William Procter, Jr.

Many pharmacy schools are in close touch with hospital pharmacies, or have charge of these departments, but doubtless the prescription files referred to would have some additional value for prescription reading and practice.

ASEPTOSOL, A NEW ANTISEPTIC PHENOL.

The ethereal oil derived from the leaves of *Chavica Betle*, a plant indigenous to the East Indies, has been found to contain a phenol as its active antiseptic constituent. This phenol has been given the name "aseptosol." This substance is not to be confounded with the already known "chavicol," which is a mixture of bodies derived from the leaves of *Chavica Betle*, and containing aseptosol as one of its constituents. This chavicol is a powerful antiseptic, five times as powerful as phenol as a bactericide. The aseptosol itself is much more active and much more stable than is the chavicol mixture. It has been obtained as a chemically pure product of melting point 15.8° C. and solidifying point 15.2°; b. p. 230–231°; sp gr. 1.0203 at 15° C. The product is almost pure white, and has an odor somewhat faintly reminiscent of phenol. It gives alkali salts which crystallize well, and does not resinify as does its allied product, eugenol.—J. McLang, *Chem. Trade J.*, p. 560 (May 7, 1926), through *Chem. & Drug.*

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AN OPPORTUNITY.*

BY ROBERT P. FISCHELIS.

The retail drug business is changing. There is no question about that. Men who years ago entered the practice of pharmacy as apprentices to the old time English, French or German apothecaries are apt to sneer at what we call the practice of pharmacy to-day. We are told that only 10% of the work of the modern retail drug store requires a knowledge of the art and science of pharmacy. When we enter such a drug store and watch its operations we realize very quickly that the foregoing statement is only too true.

However, when we carefully analyze this situation we find that it is not, of itself, as detrimental to the progress of professional pharmacy as some calamity howlers would have us believe. The many non-pharmaceutical side lines are easily explained. The American citizen wants what he wants when he wants it. Originally the only things he wanted from a drug store were drugs, medicines and sick room supplies. One store could supply a very large community with all of these for, happily, most people are not sick during much of their lifetime. But in these days of concentration of populations with the resulting enormous apartment houses and hotels that frequently are able to accommodate the entire population of a small town and many times the number of inhabitants of some that are called towns, the problem is different. These people want to be served quickly, and in order that they may have the pharmaceutical service of the drug store when they want it, the druggist must be conveniently at hand all the time. This requires numerous stores in locations where rents are not low and other expenses are greater than the income from strictly pharmaceutical activities will warrant. Hence the expansion into related and unrelated merchandising fields.

The fact that drug stores must be kept open more hours of the day than perhaps any other retail establishment tends naturally to increase the non-pharmaceutical business. The original reason for keeping open far into the night was to

* Read before the New Jersey Pharmaceutical Association at Atlantic City, N. J., June 9, 1926.

take care of the prescriptions brought in by the evening patients of physicians and to take care of emergency demands. To-day these are minor reasons. The public has been educated to expect drug stores to be open late and now looks to them as a source of supply for anything they have forgotten to buy at the grocery, hardware shop or stationery store during the day.

The object of this paper, however, is not to discuss this phase of the situation or to attempt either to justify or condemn it. It is mentioned merely as an introduction to a note of warning against complete obliteration of pharmacy in the drug store and to a practical suggestion for increasing pharmaceutical work along the lines of a recent development in the practice of medicine.

First, the note of warning!

Dr. James H. Beal, one of the clearest thinkers in American Pharmacy to-day, read a paper entitled "Holding the Franchise" before the Ohio State Pharmaceutical Association some time ago from which the following is quoted:

> "A railroad once built an expensive cut-off shortening the length of its main track by many miles, over which cut-off its regular freight and passenger traffic was thereafter carried but, nevertheless, continued to send an engine and caboose daily each way over the old track with all its heavy grades, tunnels and dangerous curves.
>
> "On inquiring the reason for sending an empty train every day over the old track, it was explained that it was to hold the franchise, that when the road was originally constructed the company assumed the obligation of running at least one train each way daily, and that it feared to discontinue the trains over this now useless track for fear that such abandonment might impair its franchise over the remainder of its right of way.
>
> "Pharmacy also holds a valuable franchise—the public belief that the compounding of prescriptions and the dispensing of drugs, medicines and poisons are functions demanding special education and the technical skill to be gained only through practical experience. It is upon this theory solely that legal restrictions upon the practice of pharmacy can be defended. It is always in order, therefore, to inquire whether pharmacists are doing all that is reasonably necessary to retain a legal hold upon their professional franchise."

That briefly calls attention to the danger. More specifically let it be said that some pharmacists in their enthusiasm for the merchandising phase of their business seem to forget all about the phase which to a large extent makes the merchandising possible.

Building up a prescription business based on the confidence of physicians and public, keeping abreast of the new developments in pharmacy and the sciences related to pharmacy, and being prepared to supply all that is needed for the healing of the sick, promptly, when required, is admittedly harder work than buying and selling merchandise of one kind or another, but if "more than a merchant" is to mean anything at all, more of us must do some of this harder work.

Lastly, a suggestion for increasing the professional work of the pharmacy and at the same time serving both the medical profession and the public!

Modern medicine has turned its activities most emphatically in the direction of disease prevention. The old proverb "A stitch in time saves nine" can nowhere be applied with greater logic than in the protection of the health of individuals and communities. The practical eradication of many contagious diseases bears eloquent testimony to the efficiency that has been reached in the field of prevention.

The average span of human life has been lengthened considerably in recent decades and if the same degree of intelligence is exercised in the care of the human

body that we bestow upon our automobiles and other machinery it will doubtless be lengthened still further.

The key to the situation is what has come to be known as the Periodic Health Examination. Briefly, this is a movement to interest people who are ostensibly in good health to submit to a medical examination once a year. The idea is not entirely new but its general application has only been advocated recently.

Most people never consult a physician until they are quite ill. Very often the illness is due to some organic defect which has been developing for some time and which might have been prevented if proper advice had been sought in its early stages.

The pharmacist will immediately think of many powerful arguments in favor of such examinations but he may doubt the possibility of encouraging the average citizen to spend his money in that way, especially if he is thinking of high-priced specialists as the examiners. The pharmacist who has had little contact with physicians will also probably wonder where he fits into this picture, either professionally or commercially.

This movement for periodic health examinations is just now a burning topic of discussion in medical associations all over the United States and the concensus of opinion is that the examinations should be conducted by the family physician rather than by the specialist. Literature is being distributed to members of the medical associations giving complete instructions as to the extent and manner of examination and standardized blank forms are available for recording the information on which diagnoses are based. In other words the general practitioner is being educated in the proper methods of conducting periodic health examinations so that there will be some uniformity in the service rendered and no lack of detail in arriving at the exact physical condition of the individual examined. The fees suggested for these examinations are very reasonable and within the reach of all.

One of the difficulties that is confronting the medical profession in connection with these Periodic Health Examinations is the question of giving proper publicity to their value. If the individual physician appears to lay too much emphasis on this matter he may be accused of a selfish interest. The Code of Ethics of the profession of medicine does not permit advertising in the usual sense of that word; consequently, there is apt to be a delay in properly acquainting the rank and file of laymen with the importance of such examinations, unless steps are taken to do so outside of the medical profession. It appears to the author of this paper that this situation has reached a point where the pharmacist can be of great service. In the first place he is in constant contact with the public and is often considered a source of information on health matters. It is therefore a simple thing for him to recommend to his customers, when the opportunity presents itself, that they submit to a periodic health examination in their own interests. He can even suggest this in his professional advertising. He can keep on file a list of the physicians in his immediate vicinity who are qualified to make such examinations and lists of specialists who may be consulted in case the individual has ascertained from the general examination that a particular body function needs attention or repair.

This would be considered as giving valuable service in the health field and it would not be entirely altruistic either for it would certainly tend to bring about better relations between physicians and pharmacists. Furthermore, the drug

store is to-day the source of just as many things used in the prevention of disease as for their cure. The chances are that the results of the examinations of the average run of citizens by competent physicians will reveal something or other which either requires treatment or which should be guarded against by proper prophylaxis of one kind or another.

In the author's estimation, no better opportunity for rendering a professional service to the public, to the medical profession, and to himself has been offered the pharmacist in a long time.

THE PHARMACIST AND PUBLIC HEALTH ACTIVITIES.

BY ANTOINE E. GREENE.*

As a member of the medical trinity, comprising medicine, dentistry and pharmacy, the pharmacist should take his proper place beside his professional confreres in the new movement for public health and preventive medicine. That pharmacy has not taken a larger part in the new program for the prolongation of life and the prevention of disease is due in a large measure to a lack of appreciation and understanding of what public health is, and what it means to the pharmacist. The busy pharmacist must be won over to public health by discovering that public health does pay in the long run. Physicians are just beginning to develop the "Health Consciousness" which is essential to success in this new program. The pharmacist and physician have concerned themselves chiefly with the treatment and removal of pathological conditions in the sick, paying but little attention, if any, to those who are not confined to bed as patients.

Public health concerns itself not only with the care of the sick, but also takes as its field of activity the well members of the community. Thin partitions divide the realms of health and disease, and the well person of to-day often is the sick man of to-morrow. To throw the protective mantle of preventive and salutary medicine over the well is the aim of public health, to which task it has called the professions of medicine, teaching, engineering and sanitary science. Public health concerns itself with the health of the people. The health of the people comprehends their physical and mental well-being.

The busy practitioner of pharmacy will first ask what can be done in the line of public health, what his share in the work will be, and how satisfactory a program can be worked out to fit in with his daily schedule of activities, broad and varied as it is.

The present status of public health, preventive medicine and popular health education owes much to the discussions and organization activity coming as a result of the surveys of health conditions in this country by national, independent and industrial health agencies. These surveys and studies were partly occasioned by the reports of the draft during the World War. The large number of exemptions from military duty, due to physical and mental defects, pointed to a dangerously low condition of national health.

One notices the present trend of health activity by such public observances as "Health Week," "First Aid Week," "No Accident Week," "Clean City Week,"

* Lecturer in Pharmacy, Howard Medical School, Washington, D. C.

etc. The pharmacist reaps the benefit of much free advertising by these popular health days and weeks, his sales often taking a more than ordinary increase in volume. The public, motivated to action by the information and publicity given to the health program by organizations and interested individuals, finds a need for the merchandise peculiar to the neighborhood drug store.

With conditions as they are, the pharmacist should take advantage of the situation and use these periods dedicated to health activities and health promotion campaigns either by individual participation or by organized coöperation in this constructive and valuable work.

Having a practical training in hygiene, bacteriology and first aid, the pharmacist should be a valuable addition and asset to any community program for health work. The neighborhood pharmacy not only occupies a key position in the community as a public service station, but it is also a potential headquarters for the dissemination of health information.

The pharmacist can offer his services as lecturer, giving popular talks to assemblies, or over the radio. The pharmacists of America have entered into the spirit of "Pharmacy Week;" they should also take no little share in the health conservation program of the nation.

Pharmacists have always taken a prominent place in campaigns for pure foods and drugs. Much good work has been done by the profession in securing health laws and regulations for the sale of poisons, etc. Comes now the opportunity to participate in the public health program of the community and nation, an opportunity to be considered a privilege and duty. The pharmacist should be guided by altruism and a confidence in the value of health work. He should feel the spirit of "Health Consciousness." Wherever pharmacists have engaged in work of this sort, they have carried out their program with success and enthusiasm, winning the interest and support of the public.

Many of the colleges of pharmacy have courses in civics and professional ethics. In these courses several lectures could be devoted to a consideration of public health, its aims and purposes. It is not proposed to add another course to the already overcrowded curricula of the schools, but the relation of the pharmacist to public health should be explained and discussed.

The state and national associations of pharmacy should investigate ways and means to take an active part in health observances and programs. Such work is a legitimate phase of pharmaceutical activity, developing to the highest degree the aim of the profession to render public service.

THE WORLD'S HISTORIANS ARE PROMOTING COÖPERATION AND PROBABLY AN ORGANIZATION.

The historians of the world have started a movement for a world-wide organization, for the purpose of conserving and promoting the writing of history. It is stated that financial help has been pledged by foundations and about twenty nations have agreed to aid the movement.

It will be admitted that the undertaking is a difficult one because of the differing viewpoints, attachments and personal interpretations, but there are great possibilities for eliminating and avoiding historical errors. The latter have been the result of a desire to appeal to certain favors and, perhaps, added interest. Facts are essential for scientific history and we may be reasonably certain that the history of American Pharmacy will be written with that end in view.

DEPARTMENT OF BUSINESS MANAGEMENT

CONDUCTED BY PAUL C. OLSEN*

HOW MY SHELVES HELP ME SELL STAPLE ITEMS.

BY JONATHAN S. WRIGHT.[1]

"More than once I have heard it said that goods well displayed are half sold. In 20 years' experience in the retail drug business that statement has proved itself many times to my satisfaction. My purpose in this article, however, is not to discuss the many ways in which window and counter displays help to sell merchandise. I merely want to explain here a method which I feel has made my shelf space sell more merchandise.

"In addition, this plan gives me such a control over stock that rare indeed is the day I must say to a customer I am temporarily out of this or that item. In Bristol it is important to keep a complete stock. Although we are only 25 miles from Philadelphia, it is usually 48 to 72 hours before we can receive an order from the wholesale houses there, as opposed to deliveries within 24 hours in most parts of Philadelphia. What is more, the cartage charges on small orders are quite an item. Under these conditions it is especially necessary to keep a careful watch of stock. Here is the plan:

"The store I own was established in 1844 and the building and wall fixtures have been in use continuously since that time. The wall shelves are plain, soft wood, spaced 6 to 10 inches apart and about 8 or 10 inches deep. The shelves themselves are about $^5/_8$-inch thick. I keep the shelves looking fresh and clean by having them painted white every year.

"If you were to walk into my store the first thing you would notice would be the fact that all the shelf stock is classified. One section holds dentifrices and tooth brushes. Close by are shaving creams, face and hand lotions, vanishing and cold creams, ointments and similar toilet articles. Another section is stocked with ready-filled bottles of household remedies—tincture of iodine, witch hazel, castor oil, etc. Another section has the insecticides and germicides. It is unnecessary to detail how all the stock is arranged. These few examples will give you the idea.

"I have tried to group on the shelves, in a logical way, my stock of staple items which sell steadily, but not necessarily in large volume. For instance, I have to carry 9 brands of tooth paste to meet the demands of my trade. In order to make any profit on this wide variety it is necessary to keep careful watch of the stock to hold it down to a minimum and still not miss any sales. To do this, each item has its own particular place on the shelf. The amount of space varies with the size of the package and the amount of stock carried. On the edge of the shelf under the space assigned to this item I tack a card the exact width of this space. On this card is lettered the name of the item occupying that space and the retail price.

"For instance, a half dozen bottles of soap liniment can be placed on a shelf

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* Instructor of Merchandising, Wharton School of Finance and Commerce, University of Pennsylvania; Lecturer on Business. [1] Retail Druggist, Bristol, Pa.

length of less than 3 inches by putting the bottles one behind the other. On the edge of the shelf under this space is a card which says, 'Soap liniment, 25c.'

"It is surprising how many uses this simple little idea has. No claims for originality are made; I saw it first in a chain grocery store and realized there was no reason why the idea could not be used in a drug store, with its even more complicated problems of stock-keeping.

"First of all, this idea of a place for everything and marking that place makes for much quicker service in waiting on people. I know this is especially true in my store on Fridays, when I have a relief man all day. He knows where to look for all the staple items and what price to charge for them.

"Secondly, I can tell at a glance when my stock of any item is exhausted or running low, which enables me to order in time. Again, it is now a simple matter to make up my weekly order for the wholesale house. I merely walk along the shelves and jot down the things needed as shown by the condition of the shelves, adding new or special goods to the order.

"Before adopting this system I have stood in front of a vacant space on the shelves and racked my brain for minutes at a time trying to think of the item that belonged in the vacant space. The little card tacked to the edge of the shelf now tells the story at a glance.

"This system also saves the time and labor of pricing every single item that goes on these shelves; the shelf card takes care of that.

"But I havent't told you yet what is really the most important value of this idea of grouping related merchandise and marking its name and price underneath on the edge of the shelf. It helps to sell more goods and this is why. My customers read these identification cards and prices and make use of them just as much as I do.

"Every day instances like this occur—A woman comes in and asks for the 25-cent size of some preparation. Her eye naturally follows my hand as I reach to the shelf for it. Then she remarks, 'Oh, I didn't know they made a 50-cent size. That looks about 3 times as large. I believe I'll take that.' My little identification card has made the sale. I have added 25 cents to the day's sales without my saying a word, and because of the economy of the larger size. I have done my customer a favor.

"Most merchants know that people are timid about asking questions. This display and identification of merchandise answers many unasked questions, such as the one just quoted, and thereby helps sales. The man who comes in for shaving soap sees the tooth paste he almost forgot to buy, because when I get the shaving soap he is almost certain to see and, perhaps, want other related goods on the shelves nearby.

"You may think that this standardized arrangement of goods on the shelves gives my store an unvaried appearance, week after week. I realize that people like to see new and different merchandise, even in a drug store. I try to accomplish this by regular and frequent changes of my window displays. In the store, constant changes are taking place in and on the perfume case, the stationery case, the rubber goods and sundry case, and the special rack for displaying books. I further vary the interior appearance of the store by changing the arrangement of merchandise on the soda fountain and back bar. In addition, a bargain table

is featured which contains, from time to time, various slow-moving items that I want to push.

"As far as that goes, the appearance of the shelves themselves is constantly changing. New goods are being added and others are being dropped as the demand for them falls off. With the flexible arrangement just explained it is easy to carry a complete stock at all times and display it on the shelves in a way that I know helps to sell it."

TOO MUCH SALESMANSHIP.

"Well, I certainly am never going in that drug store again. All I wanted was a 25-cent can of talcum powder, but I couldn't even get my change until I had listened to a long explanation about some lavender toilet water the girl was trying to sell me. Now anybody with half an eye could see that I was in a hurry when I went in there; yet she kept right on talking and now I have to sit here in the heat for half an hour because she made me miss the 2:30 interurban.

"That's always the way in that store. You buy shampoo cream and they want to sell you hair tonic. Even the boy at the soda fountain tries to sell you a box of candy to take home, when all you want is a chocolate ice cream soda."

Unfortunately, the increasing propaganda for "companion" sales is producing more and more reactions of the kind just quoted. Customers, for fear of being annoyed by this so-called "selling" talk, are literally driven away from the stores which encourage or permit such practices.

The original idea of the "companion" sales was this. Any purchaser of stationery, for instance, ought to be a good prospect at that moment for ink, a fountain pen and similar related goods. The fact of the matter is some people are good prospects and others are not, and it takes keen judgment to discern which are which.

The little girl with one dime clutched in her tiny fist obviously can't be sold anything but the 10-cent copy book for which she came. The person in a hurry is only aggravated by "selling" talk. What impresses the customer in a hurry most favorably is quick, intelligent service. The man or woman who asks for what he wants in sharp, incisive tones is irritated by suggestions from salespeople. The woman who comes inside merely to wait for a street car isn't going to keep up the practice if every time she does so she is solicited by over-anxious salespeople. These are only a few illustrations to show that indiscriminate attempts at "companion" sales are apt to be disastrous to anyone who is trying to build up a permanent business.

The way the 5- and 10-cent stores handle the problem of "companion" sales is interesting. In some of these chains the salespeople have strict instructions not to speak to a customer unless they are first addressed by the customer. How are "companion" sales made under these conditions? It is a cardinal rule in many 5- and 10-cent stores that *every* item in stock must be displayed and accessible to the customers.

A woman comes in to buy pen points. As she selects a few, her eye wanders to the display of pencils. She remarks to herself, "These would be just the thing for Junior's school work. We never have enough around the house. I believe

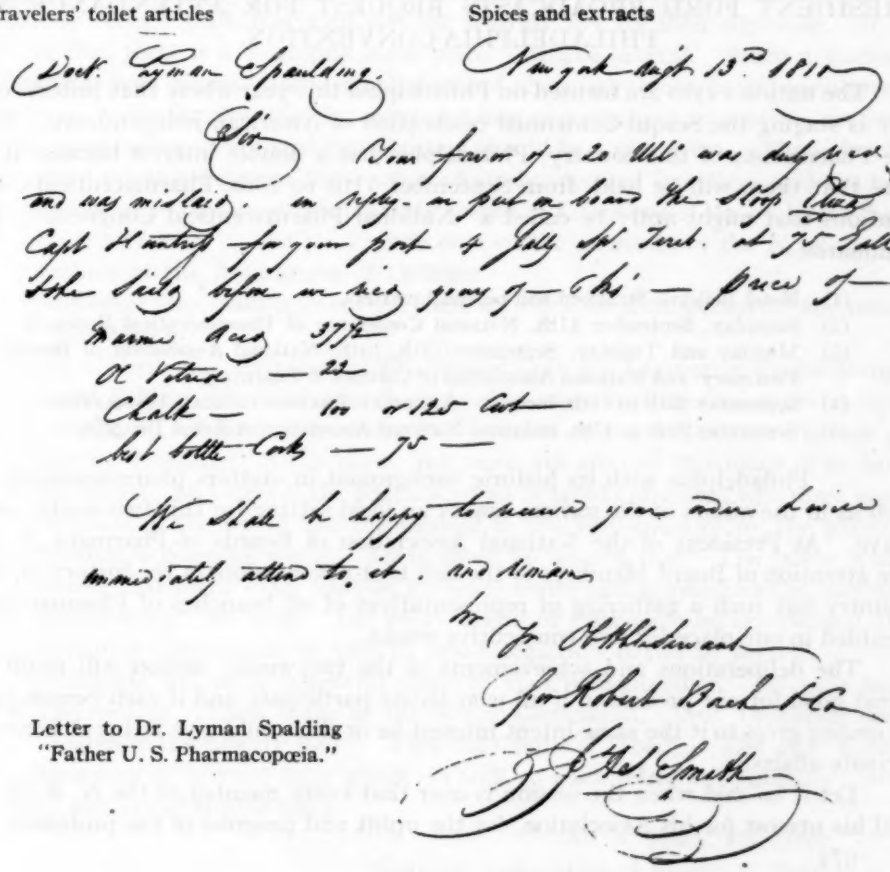
I'll get a half a dozen so as to be sure to have plenty. And we do need a tube of mucilage. Here it is—only 10 cents."

No salesperson has said a word. The displays alone have made the additional sales. Any intelligent druggist can employ his displays to make similar additional sales for him and make them without the risk of offending and driving away his customers.

This idea of letting the customer make the first advances is not confined to to the 5- and 10-cent stores. Some of the finest stores in the United States forbid their salespeople to approach a customer until the customer speaks to them. The reason is obvious. People don't shop or "look around" in stores in which they feel salespeople will be over-solicitous. The displays should be allowed to begin the work of arousing interest in the merchandise; then the salesperson, when he does talk, is assured of an interested hearer.

SEASONABLE DISPLAYS FOR AUGUST AND SEPTEMBER.

Cameras and films	Soaps and bath supplies
Developing, printing and enlarging service	First aid kits
Vacuum bottles	Sunburn and ivy poison lotions
Week-end candy and tobacco supplies	Stationery and school supplies
Telephone and mail order service	Fountain pens
Soda fountain Packaged ice cream	Gold and silver pencils
Travelers' toilet articles	Spices and extracts



Letter to Dr. Lyman Spalding
"Father U. S. Pharmacopœia."

THE DEPARTMENT OF THE NATIONAL ASSOCIATION OF BOARDS OF PHARMACY

M. N. Ford, President, Columbus, Ohio. J. W. Gayle, Treasurer, Frankfort, Ky. Edw. H. Walsdorf, Chairman of Executive Committee, New Orleans, La. H. C. Christensen, Secretary, 130 N. Wells St., Chicago, Ill.

ACTIVE MEMBER STATES.

Alabama	Iowa	Montana	South Carolina
Arizona	Kansas	Nebraska	South Dakota
Arkansas	Kentucky	Nevada	Tennessee
Colorado	Louisiana	New Hampshire	Texas
Connecticut	Maine	New Mexico	Utah
Delaware	Maryland	North Carolina	Vermont
D. of Columbia	Massachusetts	North Dakota	Virginia
Florida	Michigan	Ohio	Washington
Georgia	Minnesota	Oklahoma	West Virginia
Idaho	Mississippi	Oregon	Wisconsin
Illinois	Missouri	Pennsylvania	Wyoming
Indiana			

PRESIDENT FORD BROADCASTS REQUEST FOR ATTENDANCE AT PHILADELPHIA CONVENTION.

The nation's eyes are focused on Philadelphia this year where that historic old city is staging the Sesqui-Centennial celebration of American independence. For the Pharmacists of this country, Philadelphia has a double interest because it is here that there will be held, from September 11th to 25th, Pharmaceutical Conventions that might aptly be called a "National Pharmaceutical Congress." To summarize:

(1) Hotel Bellevue-Stratford will be Headquarters.
(2) Saturday, September 11th, National Conference of Pharmaceutical Research.
(3) Monday and Tuesday, September 13th, 14th, National Association of Boards of Pharmacy and National Association of Colleges of Pharmacy.
(4) September 15th to 18th, inclusive, AMERICAN PHARMACEUTICAL ASSOCIATION.
(5) September 20th to 25th, inclusive, National Association of Retail Druggists.

Philadelphia with its historic background in matters pharmaceutical, as well as in the affairs of the nation, makes an ideal setting for this two-weeks' conclave. As President of the National Association of Boards of Pharmacy, I call the attention of Board Members to the fact that never before in the history of this country has such a gathering of representatives of all branches of Pharmacy assembled in one place for two consecutive weeks.

The deliberations and achievements of the two-weeks' session will result in great good for our profession if all who *should* participate and if each person *participating* gives to it the same intent interest he or she would give to his or her own private affairs.

Let it be said when the session is over that every member of the N. A. B. P. did his utmost for his Association, for the uplift and progress of the profession he

represents, and for the safety of the public which he is sworn to protect to the best of his ability.

Let every State Board of Pharmacy send delegates to this meeting—the more the better. Nothing is so killing to an organization as *Indifference.* Better a man should come to oppose than stay at home and neglect.

One outstanding event requires special mention. That is the joint meeting of the Boards with the Colleges, Tuesday forenoon, September 14th. Beginning last year the Colleges of the American Association of Colleges of Pharmacy advanced to a three-year course. Present indications are that some schools are merely spreading their old two-year curriculum over a three-year period. Other schools apparently have swung to the opposite extreme and are making their courses semi-medical in nature.

At this joint meeting an effort will be made to arrive at some general understanding as to what shall constitute a minimum requirement in subjects, hours of class room, periods of laboratory instruction and the nature of such class and laboratory instruction.

In spite of more than fifteen years of effort on the part of Boards and Schools, there is still a wide spread, in many instances, between the college courses and board examinations. Evidence of this is the failure in Board Examinations of altogether too many college graduates with the ink scarcely dry on their diplomas. It is obvious that there is a weak link some place. Maybe several. When a student graduates from a generally recognized school of pharmacy, when he has been given a diploma by the faculty, thereby certifying him as competent to practice his profession, then failure on a Board Examination should be a rare event. There should be a sound relation between the courses of study received in college and the examination he must pass to obtain his state license. This is one of the problems that will receive attention by the joint conference of the members of the N. A. B. P. and members of the Association of Colleges.

Many other important matters will come up which need our concerted and most serious consideration.

Some of them are: Relations of Boards and Colleges, Legislative Propositions, Professional Ethics, *Administrative Business Training for Pharmacists* and adoption of a plan to be used in selecting the location of the $1,000,000 Pharmacy Headquarters' Building. All of these, and more, are vital to Pharmacy of to-day and of the future; no longer is the pharmacist an isolated individual who must hew alone his place in the world like the pioneer in the wilderness or on the plains. It has become a complex world. There must be mass action. The fellow who shirks throws that much extra load on his team-mates and jeopardizes the success of the undertaking. So come. Let every Board of Pharmacy be represented at the Philadelphia Convention, at least by two delegates. Better by several.

Philadelphia will be a delightful place to visit in September. Do your bit at the Convention. Then share in the Sesqui-Centennial. Visit Independence Hall. "Listen to the Liberty Bell." View the Cradle of Liberty. Get away from the irksome routine of your daily grind. You'll go back refreshed, animated, enthusiastic and proud of pharmacy.

M. N. FORD, *President,*
National Association of Boards of Pharmacy.

NEWS ITEMS OF STATE BOARDS OF PHARMACY.

Florida.—At the June examination, 70 candidates were examined for registration as pharmacists, of which number 19 were successful. At this same meeting, 119 applicants from 26 States were granted registration by reciprocity. Names of States and number from each State are as follows:

Alabama 6; Arkansas 2; Connecticut 2; Delaware 1; Georgia 42; Illinois 7; Indiana 8; Iowa 2; Kansas 1; Kentucky 3; Louisiana 2; Maine 1; Massachusetts 3; Michigan 5; Mississippi 4; Missouri 1; New Hampshire 1; North Carolina 1; Ohio 1; Oklahoma 4; Pennsylvania 4; South Carolina 5; Tennessee 3; Virginia 8; West Virginia 1; Wisconsin 1.

Illinois.—The Illinois Pharmacy Examiners met on July 13th–14th in the Springfield Office of the Department of Registration and Education to assemble examination grades of approximately 450 candidates for registration as pharmacists and assistant pharmacists who took examinations during the week of June 7th.

Out of the class of 343 candidates who were permitted to write on the registered pharmacist examination, in full or in part, 184 qualified with credentials entitling them to take the entire examination, and of this number 92 received averages of at least 75% with not less than 60% on any one branch or subject, and were granted state certificates as registered pharmacists.

The remaining 159 candidates, graduates in pharmacy but without sufficient practical experience to permit them to take the entire examination, were allowed to take the written subjects, Pharmacy, Materia Medica, Chemistry and Pharmaceutical Mathematics; 76 of the 159 made the required grade of at least 75% in each of these four subjects. These grades will stand to their credit until such time as they qualify with the required amount of practical experience, when they will be permitted to take the practical and oral subjects of examination. Eighty-three of the 159 failed to make at least 75% in each of the four written subjects on which they were permitted to take examination, and will therefore be required to take the entire examination when they qualify with sufficient practical experience.

Of the number of candidates who took the examination for assistant pharmacists, approximately 50% were successful.

Reciprocal registrations were recently granted by the Board as follows:

Hans A. E. Borjesson, Joseph K. Carlisle, John F. Coakley, J. W. Crabb, Lyle Dawson, Harry W. Hammitt, A. J. Miller, Edward Reel, Gordon Ely and Edward F. Henry, all of Iowa; Ernest O. Brooks and Harry G. Huth of Wisconsin; Perry H. Brown of South Dakota; Paul S. Bryne of Pennsylvania; Donald B. DeVerter and Raymond Minch, both of Indiana; Harvey Goldfeder of Oklahoma; Walter R. Williams and Ludwig O. Benz, both of Nebraska; George K. Charles and Harry Paulsen, both of Missouri; Edwin Milligan of Texas; Theodore C. Hendricks of Mississippi; Harry G. Janson and Clarence Romeyn, both of Michigan; Norman Herbert Jensen of Washington; Retha Partee of Tennessee; Robert E. Van Clief of Minnesota.

While the figures given are approximately correct, it was too early when this information was obtained to attempt to give exact figures.

Maine.—At the June examination by the Board, only two of a class of sixteen candidates were successful in passing the examination for registered pharmacist. Vincent M. Chaine from Massachusetts was granted reciprocal registration. Although Maine has not succeeded in having a law passed to require graduation from a recognized school or college of pharmacy for entrance to examination for registered pharmacist, the Board gives a high-grade examination in its effort to protect the public from incompetents becoming registered.

Now with George O. Tuttle of Portland as a member of the Board, who is a leading spirit in the councils of the Maine Pharmaceutical Association, a strong effort will be made at the next term of the state legislature to secure the enactment of a law or an amendment to the present law requiring graduation from a recognized school or college of pharmacy as a qualification for entrance to examination for registration as a pharmacist. While not wholly successful before the last legislature, Maine did succeed in having a citizenship clause passed and also in raising the preliminary education requirement to two years of high school. Members of the Board expect to attend the N. A. B. P. Convention to be held on September 13th–14th in Philadelphia.

Maryland.—At the June meeting of the Board, J. Fuller Frames of Baltimore was elected *President* and Robert L. Swain, also of Baltimore, was elected *Secretary-Treasurer*. Eighty-one candidates took examination for registration as pharmacists. Out of this number 22 passed in full and were granted registration. Twenty-nine others passed the written subjects of examination in Pharmacy, Materia Medica, Chemistry and Pharmaceutical and Chemical Mathematics, but because of not having had the legal requirements as to practical experience, registration is withheld until such time as they qualify with the required practical experience and pass an examination in "practical pharmacy"—actual compounding of prescriptions and other preparations. Out of the total number of 81 candidates taking the examination, 30 failed.

There were 35 candidates for registration as assistant pharmacists, of which number 27 passed and 8 failed.

Registration by reciprocity was granted to the following:

Robert H. Driskill, on basis of Georgia registration; James H. Forsyth, on basis of Wisconsin registration; Liquori J. Kelly, on basis of West Virginia registration.

New Jersey.—The Board of Pharmacy of the State of New Jersey now consists of the following: *President*, Daniel H. Hills, Spring Lake; *Vice-President*, Harry E. Bischoff, Union City; *Treasurer*, William H. McNeill, Midland Park; Harry C. Crooks, South Orange; G. Graham McCloskey, Elizabeth; *Secretary*, Robert P. Fischelis, Spring Lake.

Until further notice all communications to the Board should be addressed to the Secretary at Spring Lake, N. J.

North Carolina.—At the meeting of the Board held at Chapel Hill, June 14th and 15th, 46 candidates were examined, of which number 35 were successful in passing the examination for registered pharmacists; Eight were granted registration as assistant pharmacists.

The next meeting of the Board will be held at Chapel Hill, November 22, 1926.

Ohio.—The Board recently granted 121 pharmacists' certificates and 97 assistant pharmacists' certificates to applicants who had taken examinations July 15 to 18. Five applicants were granted registration by reciprocity as follows:

John E. North and Norman E. Hallman from Pennsylvania; Julius D. Hetessy and Rex R. Reed from Wisconsin; and Arthur J. Brown, from West Virginia.

In the re-organization of the Board, the following officers were elected: *President*, F. H. King of Delphos; *Vice-President*, J. S. Rutledge of Akron; *Secretary*, M. N. Ford of Columbus.

The next examination will be held in Columbus commencing October 12.

Tennessee.—Registration by reciprocity recently has been granted to the following:

Clayton E. Bolinger, George Alvin Leonard, Tom L. Morton and J. Albert Stuart, all of Georgia; C. L. Posey of Louisiana; R. B. Tudor of Texas; and Claud B. Walthall of Nebraska.

Texas.—Reciprocal registrations were recently granted by the Board as follows:

William O. Averys and Fred H. Davis from Georgia; James T. Cunningham from Tennessee; Wm. H. Ellis and David C. Fisher from Arkansas; R. T. Hobson from Wyoming; and James L. Sallee from Kansas.

It is thought that the recent meeting of the Texas Pharmaceutical Association in Dallas must have been the largest State meeting of druggists in the country. Two thousand druggists registered at the meeting. A considerable number of druggists from other States were also present, including the members of the Oklahoma Board of Pharmacy. The meeting was a celebration of the Association's forty-seventh birthday, in the city of its birth. Texas now has 200 drug stores and a total of 7200 registered pharmacists.

Virginia.—The Board held examinations in Richmond on June 2nd and 3rd. There were 36 candidates for registration as pharmacists, by examination, of which number 26 were successful; 16 out of a class of 28 succeeded in passing the examination for registration as assistant pharmacists.

Registration by reciprocity was granted to the following:

Gregory A. Galvin, basis of West Virginia registration; Guy E. Hall, basis of Tennessee registration; A. Percy Westbrook, basis of North Carolina registration.

J. C. Kearfott of Martinsville and D. E. Seagle of Pulaski, recently appointed as members of the Board, served for the first time at this meeting. The other members of the Board are W. W. Lyle, President, of Bedford; H. C. Littlejohn, Vice-President, of Leesburg; and J. W. Williamson of Harrisonburg. A. L. I. Winne of Richmond is Secretary-Treasurer.

PARTIAL PROGRAM OF THE JOINT SESSION OF THE AMERICAN COLLEGES OF PHARMACY AND NATIONAL ASSOCIATION OF BOARDS OF PHARMACY.

Report of the Fairchild Scholarship Committee—E. G. Eberle, Chairman.

Paper, "Newer Types of Examination"—Charles B. Jordan.

Report of Committees on Relation of Boards with Colleges—Charles J. Clayton, Charles B. Jordan.

"How Shall Individual State Boards Determine What Colleges of Pharmacy Not Belonging to the Association Shall be Approved by Them?"—Rufus A. Lyman, Edward Spease.

"To What Extent Shall Correlation of Schools and Boards Exist?"—J. F. Simon, Charles H. LaWall.

NEWS ITEM.

It is noted under "Personal and News Items" and in the Department of National Association of Boards of Pharmacy that Dr. Robert P. Fischelis has been elected *Secretary* of the New Jersey Board of Pharmacy. President Hills has expressed himself as highly pleased with the acceptance by Secretary-Elect Fischelis. The latter will continue his other duties as editor of the "News Edition" of *Industrial and Engineering Chemistry*, in various consulting capacities, etc.

For Roster of Board Members—see "Advertising Section," pp. X, *et seq.*

THE DEPARTMENT OF THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

MARKING SYSTEMS.*

BY WILLIAM J. HUSA.[1,2]

INTRODUCTION.

At the 1925 meeting of the American Association of Colleges of Pharmacy the committee on curriculum and teaching methods recommended a uniform marking system.[1]

A great variety of marking systems is in use. The main purpose of this article is to present a compilation of the advantages and disadvantages of each of the chief types of marking systems. Further, the writer wishes to make available to others the results of a survey of the grades used in the various colleges of the Association.

LETTER SYSTEMS VS. NUMERICAL SYSTEMS.

For a preliminary rough classification, all marking systems may be classified into groups, according to whether use is made of (1) numerical grades, or (2) letters or words. The above-mentioned survey, in which information was secured from 47 of the 48 member colleges, indicated that 14 colleges use numerical grades and 33 use letters.

A numerical system has the following advantages: (1) ease of grading examination papers, *i. e.*, each question can be assigned a numerical value and the results added, (2) ease of calculating average grades for determining honors, etc., (3) a percentage system may indicate an approach to a standard. The disadvantages of a numerical system are: (1) generally the scale is too fine, (2) it is probably more difficult to grade consistently unless a definite distribution of grades is decided upon as is generally done in letter systems.

Letter systems have advantages as follows: (1) in the ordinary letter systems the scale is not too fine, (2) in a 4- or 5-letter system it is sufficient to classify the students into 4 or 5 groups, instead of attempting to place a percentage or numerical valuation on each student. The chief disadvantage of letter systems is that it is difficult to compute averages of letters without translating them into numbers.

Under letter systems, daily and monthly grades are sometimes recorded by the teacher in numerical form and translated into letters for the final report to the registrar. Under numerical systems, recitations and written examinations are sometimes graded in letters and converted to a numerical scale at the end of the course. In some letter systems, the letters are officially defined by the college in terms of numbers on a scale of 100. Of the 33 member colleges using letter systems, 21 use letters which are given a definite numerical significance.

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* Superior numbers refer to bibliography; figures in parenthesis are used for enumeration.

[1] Professor of Pharmacy, University of Florida.

[2] The author is indebted to the member colleges for information on their marking systems, and to Dr. Joseph Roemer and Dr. J. R. Fulk of the Teachers College of the University of Florida for helpful suggestions.

FINENESS OF SCALE.

Starch[2] has investigated the problem of how fine a scale of units may be used satisfactorily. From the results of extensive experiments on the grading of the same paper by many different teachers and of the same paper by the same person after a lapse of time he concludes that a numerical marking scale, instead of being 100, 99, 98, 97, 96, 95, etc., should be 100, 95, 90, 85, 80, etc. He suggests that even the latter scale might perhaps better be replaced by a coarser one. Starch admits that the finer scale, if conscientiously used, probably tends to stimulate the making of finer distinctions, but he cites the following objections to a very fine scale: (1) an illusion of accuracy, (2) an injustice to the student of supposed differences where no differences actually exist, or where the relative merit may be just reversed, (3) embarrassment to the teacher due to this injustice.

Letter systems may be classified according to the number of letters used to indicate passing work. Of the 33 member colleges using letters, 1 has 5 passing letters, 21 use 4 passing letters, 10 use 3 passing letters and 1 uses 1 passing letter.

The system of one pass mark used by one college is in use in the graduate colleges of some of our leading universities. The advantage of this method is that it reduces the work of grading down to the mere act of separating the "sheep" from the "goats." It may also promote a more democratic feeling among the students. The objection to this system is that it does not tell enough. For instance in getting the results of an election, we wish to know not only who was elected but also by how many votes. Likewise in receiving the report on his work in a course a student wishes to know not only whether he passed or failed, but by how much.

Systems of two passing letters are not in use in any of the member colleges, 10 colleges, however, use a system of three pass marks. Such a system readily lends itself to the classification of students as "above average," "average," and "below average."

In recent years this system has been replaced in a number of colleges by a system of 4 pass marks. The chief reason for such a change is that in the 3-letter system the "above average" group is fairly large, and sufficient recognition is not given to the exceptional student. The remedy has been to subdivide the "above average" group into a small group of exceptional students and a larger group whose work is above the average. In the system of 5 pass marks, both the "above average" and "below average" groups are subdivided. A distinction is thus made between the students who are somewhat below average and those who are almost failures. This subdivision of the "below average" group has not proved to be worth the effort and there has been a marked tendency to discard the 5-letter system for one of 4 letters. At present only one member college uses 5 pass marks. It is evident that the system of 4 pass marks is growing in popularity.

DISTRIBUTION OF GRADES.

An important question that arises in connection with marking systems is, "How shall the marks be distributed?" That is, how frequently in the long run shall each unit on the scale be assigned? A typical distribution of passing grades under the 4 pass mark system is A, excellent—5 per cent, B, above average—20 per cent, C, average—50 per cent, D, below average—25 per cent.

Starch[2] maintains the viewpoint that marks on the whole and for large groups of students of usual ability should be distributed with a reasonably close conformity to the normal bell-shaped probability curve. The chief reasons he cites for this principle are: (1) that physical traits, such as height, length of arms and girth of head are distributed in accordance with the probability curve, (2) that mental functions of which accurate measurements have been made are also distributed in this fashion, and (3) that marks assigned by many teachers to the same pupils approximate closely to this distribution. He recognizes, however, three factors which tend to disturb this distribution of ability: (1) elimination of the poorer pupils as they pass from grade to grade, (2) the raising of performance of pupils by good teaching, and (3) the lowering of their performance because of lack of maximum effort.

Pressey[3] concludes that the distribution of performance in a given subject would be affected by, (1) the distribution of incentives, (2) the distribution of teaching effort and (3) the relation of performance to standards in the given subject. Some teachers may devote chief attention to development of superior pupils, while others may work more with the poor students in an effort to get them over the passing mark. Thus the natural distribution of performance may be disturbed and a different distribution of grades may result.

Tidyman[4] states that the common marking system assumes that the college gets an unselected group of persons, and that each class in the school has approximately the same selection of students. He feels, however, that it is quite likely that on close examination neither of these assumptions will be found true in the majority of colleges. Tidyman cites examples of the use of intelligence tests as an aid in determining a fair distribution of grades but he realizes that intelligence is only one of the many factors determining achievement. Davenport[5] has proposed a method of calculating the average ability of a class based on previous grades since entering college. When an excessive number of poor students entered a course, the grades would have to run low, and vice versa.

Starch[2] concludes that, on the whole, marks will be assigned more justly if they are assigned with reasonably close conformity to the probability distribution, than if no heed is given to it and every teacher allowed to follow his own inclination. In his opinion, large deviations should occur only when genuine reasons exist.

As Mendenhall[6] has stated, any grade is defined ultimately by the number of students receiving it. Under any given marking system, it is thus important to have some practical method of standardizing the distribution of grades. In the survey of member colleges, this point was not closely investigated, but it seems that the colleges using a letter system lay more stress on distribution than is the case in colleges using a numerical system.

HOW CAN UNIFORMITY BE SECURED?

In the preceding discussion attention has been centered on the pass marks, it being assumed that these were the only marks of practical importance in cases of students changing from one college to another. Any course in which the student was marked "incomplete" or "conditioned" would have to be repeated unless the deficiency was made up at the college which gave the grade.

In view of the fact that the marking system is largely a matter which concerns

the individual college, it would probably be unwise for any organization like our Association to require the use of a uniform marking system at present. But the convenience of uniform marking would be so great that everything possible should be done to bring colleges closer together on this point. Progress could be made if the Association would decide on a model system, such as the system of 4 pass marks recommended by the committee on curriculum and teaching methods. It might then be feasible to require the deans to prepare, for students desiring to transfer from one college to another, an official transcript on which the grades would be translated into the uniform system of the Association. This would require a little effort, and this required effort would be an incentive to each college to adopt the uniform system.

While the survey was being made, one university reported that a new marking system had just been adopted and another wrote that a change was contemplated from a numerical system to a letter system. The point is that changes are being made from time to time and if these changes could all be focussed in one direction there would soon be much greater uniformity than exists at present. In colleges affiliated with universities, I see no reason why the pharmacy college should not have as much voice in the matter as any other college. A change might not be possible immediately, but at any time when a change was proposed the pharmacy college could advocate the system adopted by the A. A. C. P.

It is hardly necessary to dwell on the disadvantages of having so many different methods of marking. A student in his career from the elementary school through high school, college and the graduate school has been known to encounter as many as five different marking systems. Thus parents have difficulty in following the progress of their children, high school principals seeking college records of their graduates, and colleges seeking high school records are handicapped, and when students change from one university to another each case requires special effort in translating grades for awarding honors, etc. Smith[7] states that in these days of efficiency it seems as though institutions of the highest learning all over the country might at least set the example of providing a uniform marking system which could be understood by any intelligent person.

There is an opportunity for our Association to do a great constructive work in education by working towards the adoption of a uniform marking system.

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(4) Tidyman, W. F., *School and Society*, 22, 247–8 (1925).
(5) Davenport, H. J., quoted by Rogers, J. H., *School and Society*, 22, 160–2 (1925).
(6) Mendenhall, quoted by Brooks, R. C., *School and Society*, 1, 32–5 (1915).
(7) Smith, F. L., *Education*, 42, 98–100 (1921).

ABSTRACTS OF MARKING SYSTEMS REPORTED BY EACH COLLEGE.

I. SYSTEMS OF FIVE LETTERS FOR PASSING WORK.

1. South Dakota State College, Division of Pharmacy.

Pass Marks.		*Non-pass Marks.*
E = excellent.	I = low.	D = deferred.
S = superior.	P = passed.	F = failed.
M = medium or average.	C = condition.	

Grade points are assigned as follows:
E = 1.5, S = 1.3, M = 1, I = 0.5, P = 0.

II. SYSTEMS OF FOUR LETTERS FOR PASSING WORK.

a. *Letters without numerical significance.*

1. Purdue University, School of Pharmacy.

The new system adopted to go in effect in 1926 is as follows:
Pass Marks = H, A, B, P. *Non-Pass Marks* = D, F, I.
Distribution expected H = 5%, A = 20%, B = 50%, P = 18%, D, F and I = 7%.
In the three-year course in pharmacy a grade of B or higher in at least 65 semester hours of work is required for graduation.

2. Ohio State University, College of Pharmacy.

Pass Marks.
A = excellent.
B = good.
C = average
D = pass.

Non-pass Marks.
E = failed.
I = incomplete.
Prog. = progress (used in thesis work).

Grade points are assigned as follows:
A = 4 points, B = 3 points, C = 2 points, D = 1 point, E = 0 points.
An average of 1.8 points is required for graduation.

3. Ohio Northern University, College of Pharmacy.

Pass Marks.
Ex. = excellent.
G = good.
Av. = average.
P = passed.

Non-pass Marks.
Cn. = conditioned.
F = failed.

4. University of Kansas, School of Pharmacy.

Pass Marks: A, B, C, D. *Non-pass Marks:* I = incomplete; F = failed.
Not more than 23 and 31 credit hours of D allowed for degrees of Ph.C. and B.S., respectively.

5. University of Michigan, College of Pharmacy.

Pass Marks.
A = excellent.
B = good.
C = fair.
D = unsatisfactory, passed without points.

Non-pass Marks.
E = not passed, no credit.
I = incomplete.
X = absent from final examination.

Grade points: A = 3, B = 2, C = 1, D = 0. In order to graduate a student must have as many points as hours credit.

6. University of California, California College of Pharmacy.

Pass Marks.
A = excellent.
B = good.
C = fair.
D = barely passing.

Non-pass Marks.
E = unsatisfactory (entitled to re-examination).
F = failure.

7. University of North Carolina, School of Pharmacy.

Pass Marks.
A = excellent.
B = good.
C = fair.
D = barely passing.

Non-pass Marks.
E = condition (removable by re-examination).
F = failure.

8. State University of Iowa, College of Pharmacy.

Pass Marks: A, B, C, D. *Non-pass Marks:* Inc. = incomplete, Cond. = condition, Fd. = failed.

Distribution expected: A = 5 to 7 per cent.
B = 20 per cent.
C = 50 per cent.
D = 25 per cent.
Of the passing students in a given individual course through an extended period of years.

9. University of Southern California, College of Pharmacy.

Pass Marks.
A = excellent.
B = good.
C = fair.
D = passing.

Non-pass Marks.
Con. = conditional.
Inc. = incomplete.
F = failure.

Grade Points: A = 3, B = 2, C = 1, D = 0.

b. Letters with numerical significance.

1. University of Tennessee, School of Pharmacy.

Pass Marks.
E = excellent = 95–100 per cent.
G = good = 85–94 per cent.
S = satisfactory = 75–84 per cent.
P = pass = 70–74 per cent.

Non-pass Marks.
D = deficient = 60–69 per cent.
X = failure = below 60 per cent.

2. George Washington University, School of Pharmacy.

Pass Marks.
A = 96–100.
B = 90–95.
C = 80–89.
D = 70–79.

Non-pass Marks.
E = failure.
F = incomplete.

3. University of Illinois, School of Pharmacy.

Pass Marks.
A = 95–100.
B = 85–94.
C = 75–84.
D = 70–74.

Non-pass Marks.
E = below 70.

4. College of the City of Detroit, School of Pharmacy.

Pass Marks.
A = 90–100 per cent.
B = 80–89 per cent.
C = 70–79 per cent.
D = 60–69 per cent, unsatisfactory, hours but no points.

Non-pass Marks.
E = below 60 per cent (failure).

5. University of Wisconsin, Course in Pharmacy.

Pass Marks.
A = excellent = 93–100.
B = good = 85–92.
C = fair = 77–84.
D = poor = 70–76.

Non-pass Marks.
Conditional = 60–69.
Failed = below 60.
Inc. = incomplete.

6. University of Montana, School of Pharmacy.

Pass Marks.
A = 90–100.
B = 80–90.
C = 70–80.
D = 60–70.

Non-pass Marks.
E = condition.
F = failed.

The standard grade curve is used as a guide. Students must make a C average to graduate normally.

7. Oregon Agricultural College, School of Pharmacy.

Pass Marks.
A = 93–100 per cent.
B = 85–92 per cent.
C = 78–84 per cent.
D = 70–77 per cent.

Non-pass Marks.
Incomplete.
E = condition = 60–69 per cent.
F = failure = below 60 per cent.

8. University of Washington, College of Pharmacy.

Pass Marks.
A = 96–100 per cent.
B = 86–95 per cent.
C = 76–85 per cent.
D = 70–75 per cent.

Non-pass Marks.
I = incomplete.
E = failure = below 70.

A student must earn $^2/_3$ of grades above D in any one year to be allowed to return the next year. A grade of I can be given only if a student has a passing grade up to within two weeks of end of course.

9. Valparaiso University, School of Pharmacy.

Pass Marks.
A = 95–100.
B+ = 90–94.
B = 85–89.
C+ = 80–84.
C = 75–79.
D = 70–74.

Non-pass Marks.
E = 65–69.
F = below 65 = failed.
(−) = failed (dropped).
Inc. = deferred.
W = withdrawn.
W. F. = withdrawn for failure.
r = see professor's report.

10. University of Minnesota, College of Pharmacy.

Pass Marks.
A = 93–100.
B = 87–93.
C = 81–87.
D = 75–81.

Non-pass Marks.
F = failure.
E = condition.
I = incomplete.

11. State College of Washington, School of Pharmacy.

Pass Marks.
A = 97.
B = 90.
C = 80.
K = 72.

Non-pass Marks.
F = below 70 = failure.
W = withdrawal after fourth week, the work being passing up to that time
Inc. = incomplete.
con. = incomplete (not made up the following semester or arranged for, and for this a K grade only can be given.

12. Des Moines University, College of Pharmacy.

Pass Marks.
A = excellent = 93–100.
B = good = 85–92.
C = fair = 77–84.
D = passing = 70–76.

Non-pass Marks.
E = condition = 60–69.
F = failure = below 60.
I = incomplete.

A system of honor points is used.

III. SYSTEMS OF THREE LETTERS FOR PASSING WORK.

a. Without numerical significance.

1. University of Mississippi, School of Pharmacy.

Pass Marks.
A = excellent.
B = medium.
C = passing.

Non-pass Marks.
D = failure on which re-examination may be granted by the professor.
F = failure.

b. With numerical significance.

1. Philadelphia College of Pharmacy and Science.

Pass Marks.
A = 90–100.
B = 80–90.
C = 70–80.

Non-pass Marks.
D = 60–70.
E = 50–60.

The passing grade of all subjects of the freshman, sophomore and junior year is 70. The passing grade for all subjects of the graduating year is 75.

2. Medical College of Virginia, School of Pharmacy.

Pass Marks.
A = 96–100.
B = 90–95.
C = 80–89.

Non-pass Marks.
D = 70–79.
E = below 70.

3. University of Oklahoma, School of Pharmacy.

Pass Marks.
A = 95–100.
A – = 90–95.
B = 85–90.
B – = 80–85.
C = 75–80.
C – = 70–75.

Non-pass Marks.
I = failure to take some examination on account of some reasonable excuse.
D = failure on final, with passing grades before, or where average is between 65–70.
F = failed the course.

4. Creighton University, College of Pharmacy.

Pass Marks.
A = 90–100.
B = 80–89.
C = 75–79.

Non-pass Marks.
D = condition = below 75.
failure (no symbol).

5. Louisville College of Pharmacy.

Pass Marks.
A = 95–100.
B = 85–94.
C = 75–84.

Non-pass Marks.
D = 60–74 = condition.
F = below 60 = failure.
I = incompleted.

6. Western Reserve University, School of Pharmacy.

Pass Marks.
E = excellent = 90–100.
G = good = 80–89.
F = fair = 70–79.

Non-pass Marks.
D = conditioned = 60–69 (or if the final exam. grade is below 60 and the term average is 70 or above.
X = failed = below 60.

7. Medical College of the State of South Carolina, School of Pharmacy.

Pass Marks.
A = excellent = 95–100.
B = good = 85–94.
C = satisfactory = 75–84.

Non-pass Marks.
D = condition = 0–74.

8. Detroit Institute of Technology, College of Pharmacy and Chemistry.

Pass Marks.
A = excellent = 90–100%.
B = good = 80–89.
C = passed = 70–79.

Non-pass Marks.
D = conditional = 60–69 (work may be made up by another examination, but cannot receive a grade higher than C).
E = failed = 50–59.

9. New Jersey College of Pharmacy.

Pass Marks.	*Non-pass Marks.*
A = 90–100.	D = 60–74.
B = 80–89.	F = below 60.
C = 75–79.	

IV. SYSTEMS FOR ONE LETTER (OR WORD) FOR PASSING WORK.

1. St. Louis College of Pharmacy.

Pass Marks: Satisfactory. *Non-pass Marks:* Failure.

On written reviews students receive grades in letters as follows: A = 90–100, B = 80–89, and so on down the alphabet. The passing grade is 75%.

V. SYSTEMS BASED ON NUMBERS ONLY

1. Meharry Medical College, Department of Pharmacy.

Passing Grade: 80 per cent. One re-examination is allowed.

2. Massachusetts College of Pharmacy.

Passing Grade: 75 per cent.

An average of at least 70 per cent is required for admission to the final examination in each subject. Not more than two examinations are allowed for removal of conditions.

3. North Pacific College of Pharmacy.

Passing Grade: 75 per cent. *Non-pass Marks:* Inc. = incomplete.
C = condition.
F = failure.

4. University of Pittsburgh, Pittsburgh College of Pharmacy.

Passing Grade: 75 per cent average with not less than 60 per cent in any one subject.

5. University of Maryland, School of Pharmacy.

Passing Grade: 75 per cent. *Non-pass Marks:* 50–74% = condition.
Below 50% = failure.

6. Loyola University, New Orleans College of Pharmacy.

Passing Grade: 75. *Non-pass Marks:* 60–74 = condition.
Below 60 = failure.

7. University of Florida, College of Pharmacy.

Passing Grade: 75.

On a grade of 60–74 one re-examination is allowed, on which a grade of 85 per cent or more must be made in order to secure credit for the course.

8. North Dakota Agricultural College, School of Pharmacy.

Passing Grade: 70. *Non-pass Marks:* 60–70 = conditional, below 60 = failure.

9. West Virginia University, Medical School, Dept. of Pharmacy.

Passing Grade: 70 per cent. *Non-pass Marks:* 60–70% = condition.
Below 60% = failure.

10. Tulane University of Louisiana, School of Pharmacy.

Passing Grade: 70 per cent.

11. University of Notre Dame, School of Pharmacy.

Passing Grade: 70.

Non-pass Marks: 60–69 = conditional (*i. e.*, may obtain a grade of 70 by passing an examination for the removal of conditions). 59 and lower = failed (must repeat semester's work). Fc. = failed on account of cuts (*i. e.*, exceeding the number of unexcused absences allowed for semester).

12. University of Colorado, College of Pharmacy.

Passing Grade: 70 per cent. *Non-pass Marks:* 60–69% = inc., conditioned.
Below 60% = failure.

13. University of Nebraska, College of Pharmacy.

Passing Grade: 60 per cent. *Non-pass Marks:* 50–60% = C = condition.
I = incomplete
Below 50% = F = failure.
A = dropped in good standing.
D = dropped in bad standing.

14. Alabama Polytechnic Institute, Dept. of Pharmacy.

Passing Grade: 60. *Non-passing Marks;* 50–60 = conditional, subject to reëxamination.
Below 50 = failure.

A quality point system is used.

University of the Philippines, School of Pharmacy.—No report.

Uniform system recommended by committee on curriculum and teaching methods.

Pass Marks:

A = a mark of distinction.
B = for superior work, clearly above the average.
C = average.
D = lowest passing mark.

Non-pass Marks:

Ex. = excused.
Inc. = incomplete.
Fd. = failed.
Cond. = conditional pass.
Abs. = absence from last meeting of class.
Lt. = left.

LIBRARIES.

The interest in libraries and in having them serve in a larger way is evident in the gift of the Carnegie Corporation for the training of librarians—it emphasizes the importance of the librarian on whom the serviceableness of a library largely depends. The relationship of the librarian to the library is not so different from that of the teacher and the school. Quoting an editorial of the *New York Times* of recent date, "the Carnegie Corporation has been making grants to agencies concerned with library service, but it has now adopted a definite program for a ten-year period under which library schools and library organizations will receive endowments in such amounts as to enable them to carry on their work without anxiety or renewed calls upon the corporation. It is proposed, in the first place, to endow a library school in connection with some university which would do for the library profession what the Johns Hopkins Medical School and the Harvard Law School have done for medicine and law."

Further activities are expected to come into fruition because of the fiftieth anniversary of the founding of this library organization, such as helping small libraries throughout the United States, providing building plans, giving bibliographical aid, etc.

There also is an evident interest among members of the drug activities in the A. Ph. A. Headquarters, because of the provision for a library, and while the thought has no foundation except the opportunities for service, it may be within reason to expect encouragement from sources without the drug trade activities for the Headquarters, because it will have a service library.

PROGRAM FOR THE TWENTY-SIXTH ANNUAL MEETING OF THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY, BELLEVUE STRATFORD HOTEL, PHILADELPHIA, PA.

SEPTEMBER 13–14, 1926.

Monday, September, 13, 10:00 A.M.

Teachers Conferences.

Chemistry Section—Prof. C. C. Glover, *Chairman.*

Pharmaceutical Section—Prof. J. C. Krantz, *Chairman.*

Materia Medica Section—Dean R. A. Lyman, *Chairman.*

Monday, September 13, 2:00 P.M.

Continuation of Teachers Conferences.

First General Session—Monday, September 13, 3:00 P.M.

Roll call.

President's Address—Dean E. H. Kraus.

Report of Secretary-Treasurer—Prof. Zada M. Cooper.

Report of Executive Committee—Dean C. B. Jordan.

Appointment of Nominating Committee.

Report of Committee on High Educational Standards—Dean D. B. R. Johnson.

Paper, Merchandising Courses—Prof. J. G. Beard.

Report of Committee on Curriculum and Teaching Methods—Dean W. J. Teeters.

Report of Committee on Activities of Students of Alumni—Prof. J. B. Burt.

Report of Committee on Research—Dr. Arno Viehoever.

Report of Committee on Investigation of Pharmacy Schools by Carnegie Foundation—Dean W. F. Rudd.

Second General Session—Monday, September 13, 8:00 P.M.

Report of Committee on Curriculum—Dean C. W. Johnson.

Report of Committee on Relation of Boards & Colleges—Dean C. B. Jordan.

Address by Dr. Edgar Fahs Smith.

Report of Committee on Standards for Classification of Colleges—Dean D. B. R. Johnson.

Report of Representative to Drug Trade Bureau of Public Information—Dean W. F. Rudd.

Paper—Rating Scale for Instructors—Dean C. B. Jordan.

Report of Representative to Board of Botanical Abstracts—Prof. E. N. Gathercoal.

Report of Representative to National Conference of Pharmaceutical Research—Dean J. A. Koch.

Joint Session with N. A. B. P.—Tuesday, September 14, 9:00 A.M.

Third General Session—Tuesday, September 14, 2:30 P.M.

Report of Representative to N. A. R. D.—Dean A. R. Bliss.

Report of Committee to Conference on Narcotic Education.

Report of Delegates to National Drug Trade Conference—Dean W. F. Rudd.

Unfinished Business.

Miscellaneous.

New Business.

Executive Session.

Adjournment.

Tuesday, September 14, 6:00 P.M.

Annual Dinner of American Association of Colleges of Pharmacy.

Surgeon—General Hugh S. Cumming of the U. S. Public Health Service will give the principal address.

(All are welcome. Make reservations by consulting Dean C. B. Jordan.)

PROGRAM, SEMINAR OF PHARMACY TEACHERS.

Teaching Demonstrations:

Emulsions—Adley B. Nichols.

Prescriptions—G. A. Bergy.

Subject to be announced.—Clyde M. Snow.

CENSUS OF PHARMACEUTICAL RESEARCH, 1926.

BY H. V. ARNY.*

The Census of Pharmaceutical Research published in the JOURNAL of last year (See JOURNAL, May, 1925, page 434) created so much interest that the Conference on Pharmaceutical Research at its 1925 meeting, held in Des Moines, directed that such a census become an annual feature of our work and on the pages which follow this introduction are listed the names of 297 research workers and the subjects upon which they are working.

The questionnaire sent out was similar to that issued in 1925 and was mailed to all persons whose names were given in the 1925 census as well as to a number of the persons who were not obtained for the 1925 census.

Of the 239 persons listed in the 1925 census, 75 are not listed in the present census of 1926. Three of these, Messrs. A. B. Lyons, L. E. Sayre and L. R. Wagener have passed on to their reward. Some half dozen have written that they are not at present engaged in pharmaceutical research work, while the others have failed to respond despite the sending of two "follow-up" letters. In most cases, the persons just mentioned have either finished their thesis work at colleges and have not yet located in a place with facilities for research or else they have changed their industrial positions, leaving the laboratory where they were listed as research workers.

Despite the loss of these 75, the Census of 1926 contains 58 more names than the Census of 1925, that of 1925 containing 239 names, while that of 1926 contains 297 names. It is a matter of distinct gratification that all save two of the great pharmaceutical manufacturing plants are represented in the 1926 list; while several of the colleges not listed in 1925 have sent in adequate lists for insertion in the Census of 1926.

The 297 research workers recorded on the pages which follow may be classified as follows:

Hospital pharmacists	4
Retail pharmacists	9
Pharmacists, engaged in medical school and chemical school work	5
Governmental scientists, doing pharmaceutical research	14
Non-pharmaceutical teachers and their students doing pharmaceutical research (chiefly on the synthesis of medicinal chemicals)	31
Manufacturing pharmacists	97
Pharmaceutical teachers and their students	137
TOTAL	297

The index figures indicating coöperative work are given, this year, only in those cases where the names of persons were furnished by directors of laboratories and not by the persons themselves.

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* Chairman, National Conference on Pharmaceutical Research.

CENSUS OF PHARMACEUTICAL RESEARCH.

Index numbers intended to indicate coöperative work.

Index No.	*Name.*	*Laboratory.*	*Town.*	*Subject.*	*Remarks.*
1	Acheson, R. A.	Mass. College Pharmacy	Boston, Mass.	Gravimetric vs. colorimetric assays of hydrocyanic acid	See No. 4
2	Adams, Roger	Chemistry Bldg., Univ. Ill.	Urbana, Ill.	Chaulmoogric acid derivatives	See Nos. 49, 113, 191, 225 and 293
3	Amin, H.	College Pharmacy Univ of N. C.	Chapel Hill, N. C.	Transparent soaps from hydrogenated oils	See No. 151
4	Amrhein, F. J.	Mass. College Pharmacy	Boston, Mass.	Colorimetric assay of hydrocyanic acid	See Nos. 1, 184 and 236
5	Ariizumi, K.	College Pharmacy, Univ. Wash.	Seattle, Wash.	Effect of iron on organic iron salts	See No. 164
6	Arny, H. V.	College Pharmacy Columbia Univ.	New York, N. Y.	Colorimetric tests with standardized colored fluids	
7	Austin, R. L.	College Pharmacy, Univ. Iowa	Iowa City, Iowa	Cod liver oil as base for ointment of mercuric nitrate	See No. 43
8	Bacon, F. J.	College Pharmacy, Univ. Fla.	Gainesville, Fla.	Digitalis. Medicinal plants of Florida Mint culture in Florida	
9	Balandra, F. J.	Mass. College Pharmacy	Boston, Mass.	Quantitative microscopic analysis	See No. 294
10	Ballard, C. W.	College Pharmacy, Columbia Univ.	New York, N. Y.	Structural variations in erythroxylon leaves	
11	Barrett, L.	College Pharmacy Duquesne Univ.	Pittsburgh, Pa.	Commonwealth study of pharmacy	
12	Base, Daniel	Hynson, Westcott & Dunning	Baltimore, Md.	See Dunning	
13	Beal, G. D.	Chemistry Bldg., Univ. of Illinois	Urbana, Ill.	Medicinal fats Anthraquinone drugs Quantitative alkaloid reagents	See Nos. 137, 171, 234, 269 and 284
14	Bebie, Jules	Monsanto Chemical Works	St. Louis, Mo.	Stability of local anesthetics with changes in p_H	
15	Beringer, G. M.	Retail pharmacy	Camden, N. J.	U.S.P. and N.F. revision problems	
16	Biddy, O. D.	College Pharmacy, Univ. of N. C.	Chapel Hill, N. C.	Poison ivy remedies	See No. 123
17	Bliss, A. R.	Medical College, Univ. Tenn.	Memphis, Tenn.	Pharmacological and chemical studies	See No. 279
18	Blumenschein, F. J.	College Pharmacy, Univ. Pittsburgh	Pittsburgh, Pa.	Pharmaceutical uses of bentonite	See Nos. 144 and 238
19	Boardman, Beda	College Pharmacy, Univ. Wis.	Madison, Wis.	Wax	See No. 150
20	Bodansky, A.	Upjohn Co.	Kalamazoo, Mich.	Pharmacology of the endocrines	See No. 112
21	Bogert, M. T.	Dept. Chemistry, Columbia Univ.	New York, N. Y.	Synthesis of medicinal chemicals	Has 18 co-workers
22	Bonisteel, W. J.	College Pharmacy, Fordham Univ.	New York, N. Y.	Columbian cinchonas	See No. 198
23	Bowers, H. R.	College Pharmacy, Univ. Mich.	Ann Arbor, Mich.	Coöperative drug assay work	
24	Bradford, Caty	College Pharmacy, Univ. Wash.	Seattle, Wash.	Syrups of calcium iodide and ferrous iodide	See No. 152
25	Bradley, T. J.	Mass. College Pharmacy	Boston, Mass.	U. S. P. revision problems	
26	Braun, H. A.	College Pharmacy, Univ. Wis.	Madison, Wis.	Biochemistry of Mentha canadensis	See No. 150
27	Broady, Pell	College Pharmacy, Purdue Univ.	West Lafayette, Ind.	Precipitates of the U.S.P.	See No. 133
28	Browne, C. A.	Bureau of Chem.	Washington, D. C.	Chemical, biological and pharmacological research	
29	Bugbee, E. P.	Parke, Davis & Co.	Detroit, Mich.	Biological standardization of glandular products	See No. 241

Index No.	Name.	Laboratory.	Town.	Subject.	Remarks.
30	Burlage, H. N.	College Pharmacy, Univ. Wash.	Seattle, Wash.	Asarum cordatum	See No. 164
31	Bye, Mortimer	Frederick Stearns & Co.	Detroit, Mich.	Benzyl compounds Insulin Bio-assays, etc.	See Nos. 57, 163, 193 and 203
32	Cain, Russell	College Pharmacy, Univ. Wash.	Seattle, Wash.	Oil of Ledum Groenlandicum	See No. 164
33	Carter, E. B.	Swan-Myers Co.	Indianapolis, Ind.	Biological research	
34	Casely, R. E.	College Pharmacy, Univ. Wis.	Madison, Wis.	Synthetic glucosides of phenols	See No. 150
35	Caspe, Sol.	H. A. Metz & Co.	New York, N. Y.	See Dubin	
36	Cawley, Ellen	Phil. Coll. Pharm. & Science	Philadelphia, Pa.	Digitalis	See No. 276
37	Chen, S. Y.	College Pharmacy, Univ. Wis.	Madison, Wis.	Witherington's ointment	See No. 150
38	Chestnut, V. H.	Bureau of Chemistry	Washington, D. C.	Non-volatile constituents of the cotton plant	See No. 204
39	Christensen, B. U.	College Pharmacy, Univ. Wis.	Madison, Wis.	Chalk and other forms of calcium carbonate	See No. 150
40.	Clark, A. H.	College Pharmacy, Univ. Ill.	Chicago, Ill.	Organic mercurial medicinals	See Nos. 50, 281 and 285
41	Cook, E. F.	Phila. Coll. Pharm. & Science	Philadelphia, Pa.	U. S. P. & N. F. revision problems	
42	Cook, Richard	College Pharmacy, Univ. Wash.	Seattle, Wash.	Mountain ash berries	See No. 164
43	Cooper, Zada M.	College Pharmacy, Univ. Iowa	Iowa City, Iowa	Cod liver oil as base for ointment of mercuric nitrate	See No. 7
44	Corbitt, H. B.	H. A. Metz & Co.	New York, N. Y.	Sulfur compounds as antidotes to metallic poisons	See No. 58
45	Cowles, Russell	Digestive Ferments Co.	Detroit, Mich.	Standardization of hormones	See No. 88
46	Crockett, W. G.	Medical College of Virginia	Richmond, Va.	Rate of decomposition of ethyl nitrite in copaiba mixtures	
47	Culley, John	Retail pharmacy	Ogden, Utah	U. S. P. revision problems	
48	Darbaker, L. K.	College Pharmacy, Univ. Pittsburgh	Pittsburgh, Pa.	Bacterial problems	See Nos. 144, 170 and 266
49	Davies, Letta	Chemistry Bldg., Univ. Ill.	Urbana, Ill.	Chaulmoogric acid derivatives	See No. 2
50	Davis, H. L.	College Pharmacy, Univ. Ill.	Chicago, Ill.	Acetophenone and its derivatives	See No. 40
51	Dessemontet, E.	Lehn & Fink	Bloomfield, N. J.	Influence of certain salts on conversion of hemoglobin into methemoglobin Studies of the saliva	See Nos. 53 and 271
52	Diner, Jacob	College Pharmacy, Fordham Univ.	New York, N. Y.	Action of pancreatin on normal and diabetic animals	See No. 120
53	Dittmar, M.	Lehn & Fink	Bloomfield, N. J.	General research problems	See Nos. 51, 219, 227, 239 and 252
54	Dohme, A. R. L.	Sharp & Dohme	Baltimore, Md.	Acyl and alkyl derivatives of resorcinal	See Nos. 64, 90, 92 and 175
55	Dorjahn, J. A.	College Pharmacy, Univ. Ill.	Chicago, Ill.	Effect of heat on tragacanth mucilages	See Nos. 75 and 288
56	Dox, A. W.	Parke, Davis & Co.	Detroit, Mich.	Synthetic hypnotics	
57	Dox, Howard	Fred. Stearns & Co.	Detroit, Mich.	Drug assaying	See No. 31
58	Dubin, H. E.	H. A. Metz & Co.	New York, N. Y.	Active principles of cod liver oil Synthetic odd-carbon fats in diabetes	See Nos. 35 and 44
59	DuMez, A. G.	College Pharmacy, Univ. Md.	Baltimore, Md.	Studies in drug addiction U. S. P. revision problems	
60	Dunning, H. A. B.	Hynson, Westcott & Dunning	Baltimore, Md.	Local and general antiseptics Diagnostic tests	See Nos. 100, 253 and 286

Index No.	Name.	Laboratory.	Town.	Subject.	Remarks.
61	Eldred, F. R.	Reed & Carnrick	Jersey City, N. J.	Endocrine products	
62	Eldridge, R. W.	Sterling Chem. Lab., Yale University	New Haven, Conn.	Local anesthetics	See No. 114
63	Emery, W. O.	Bureau of Chemistry	Washington, D. C.	Halogenated antipyrines	See No. 290
64	Engelhardt, Herman	Sharp & Dohme	Baltimore, Md.	Cascara assay methods Study of "caprokol" Study of tablet manufacture and assay	See No. 54
65	Ewe, G. E.	Tailby-Nason Co.	Boston, Mass.	Manufacture and analysis of pharmaceuticals	See No. 185
66	Fackenthal, P. F.	Medical College of Virginia	Richmond, Va.	Drug plant distribution in Virginia	See No. 108
67	Fischelis, R. P.	Consulting pharmacist	Newark, N. J.	Preservation of solution of magnesium citrate Fat-free digitalis preparations	
68	Fischer, Antony	College Pharmacy, Univ. Pittsburgh	Pittsburgh, Pa.	Assay of lactose and dextrose in urine	See Nos. 144 and 209
69	Fischer, E. B.	College Pharmacy, Univ. Minnesota	Minneapolis, Minn.	Constituents of aspidium	
70	Foote, P. A.	College Pharmacy, Univ. Wis.	Madison, Wis.	Tablets	See No. 150
71	Forberg, Serena	College Pharmacy, Univ. Wis.	Madison, Wis.	Chemistry of Datura Stramonium	See No. 150
72	Frank, H. P.		Philadelphia, Pa.	Commonwealth study of pharmacy	See No. 159
73	Freedman, Louis	H. A. Metz & Co.	New York, N. Y.	Arsphenamine Neoarsphenamine Epinephrin derivatives Local anesthetics	
74	Fullerton, Bryant	Upjohn Co.	Kalamazoo, Mich.	Ovarian constituents	See No. 112
75	Gathercoal, E. N.	College Pharmacy, Univ. Illinois	Chicago, Ill.	Evaluation of cascara	See Nos. 55 and 288
76	Giesy, P. M.	E. R. Squibb & Sons	New York, N. Y.	Silver-ion concentration of colloidal silver preparations	See No. 190
77	Gilfillan, F. A.	College Pharmacy, Univ. Florida	Gainesville, Fla.	Catalytic dehydration and hydrogenation of organic compounds	
78	Gilman, Henry	Dept. of Chemistry, Iowa State Coll.	Ames, Iowa	Local anesthetics Antiseptics	See Nos. 110 and 275
79	Gilreath, A. L.	College Pharmacy, Univ. of N. C.	Chapel Hill, N. C.	Hydrogenated oils as ointment bases	See No. 151
80	Glover, C. C.	College Pharmacy, Univ. Mich.	Ann Arbor, Mich.	Coöperative drug assay work	
81	Glycart, C. K.	U. S. Food & Drug Lab.	Chicago, Ill.	Ipecac alkaloids	
82	Goeckel, H. J.	Private Lab.	Cranford, N. J.	Chemico - pathological and biological research	
83	Goeckel, Leah G.	Private Lab.	Cranford, N. J.	Chemico - pathological and biological research	
84	Goodrich, F. J.	College Pharmacy, Univ. Wash.	Seattle, Wash.	A study of Oenanthe sarmentosa	See No. 164
85	Goodrum, F. S.	College Pharmacy, Univ. of N. C.	Chapel Hill, N. C.	Sphagnum as surgical dressing	See No. 123
86	Gordon, S. M.	College Pharmacy, Univ. Wis.	Madison, Wis.	Biochemistry of the mints	See No. 150
87	Goulden, H.	E. R. Squibb & Sons	New York, N. Y.	See Riggs	
88	Graber, H. T.	Digestive Ferments Co.	Detroit, Mich.	Standardization of hormones	See Nos. 45 and 249
89	Grafflin, Mildred	Sterling Laboratory, Yale University	New Haven, Conn.	Use of Grignard reaction in synthesis of antiseptics	See No. 131
90	Grantham, R. I.	Sharp & Dohme	Baltimore, Md.	Biological assay of ergot	See No. 54
91	Gray, William	Presbyterian Hospital	Chicago, Ill.	Recipe book problems	
92	Greenwood, R. L.	Sharp & Dohme	Baltimore, Md.	Improved assay methods for tablets	See No. 54

Index No.	Name.	Laboratory.	Town.	Subject.	Remarks.
93	Griffith, Ivor	Stetson Hospital	Philadelphia, Pa.	Recipe Book problems	
94	Hall, W. A.	Retail Pharmacy	Detroit, Mich.	Spirit of nitrous ether Infusion of digitalis	
95	Hammond, Marguerite	College Pharmacy, Univ. Wash.	Seattle, Wash.	Salal Gaultheria Shallon Mixed quinhydrones	See No. 164
96	Hamilton, H. C.	Parke, Davis & Co.	Detroit, Mich.	Digitalis Hemostatic agents	
97	Handy, J. A.	Larkin Co., Inc.	Buffalo, N. Y.	Diethylphthalate	See No. 124
98	Hansen, L.	Williams College	Williamstown, Mass.	Acenaphthene derivatives	
99	Hansen, N. A.	Abbott Laboratories	North Chicago, Ill.	See Volweiler	
100	Harden, W. C.	Hynson, Westcott & Dunning	Baltimore, Md.	Glandular products Organic syntheses	See No. 60
101	Hardinger, Annette	College Pharmacy, Univ. Wash.	Seattle, Wash.	Bibliography of Northwestern plants	See No. 164
102	Harris, L. E.	College Pharmacy, Univ. Wis.	Madison, Wis.	Chemistry of annatto seed	See No. 150
103	Harrison, C. W.	U. S. Food & Drug Lab.	Baltimore, Md.	Terpin hydrate	
104	Hart, Fanchon	College Pharmacy, Columbia Univ.	New York, N. Y.	Official and unofficial mannas	
105	Hart, M. C.	Upjohn Co.	Kalamazoo, Mich.	Corpus luteum	See No. 112
106	Harvey, G. L.	Harvey - Pittenger Co.	Philadelphia, Pa.	Study of preservatives for sterile solutions	See No. 202
107	Harwood, A. A.	College Pharmacy, Univ. Wis.	Madison, Wis.	Chlorine water	See No. 150
108	Haskell, C. C.	Medical College of Virginia	Richmond, Va.	Pharmacology of digitalis, caffeine and morphine	See No. 66
109	Havenhill, L. D.	College Pharmacy, Univ. Kansas	Lawrence, Kans.	Kansas podophyllum	See Nos. 220 and 251
110	Heckert, L. C.	Dept. of Chemistry, Iowa State Coll.	Ames, Iowa	Local anesthetics	See No. 78
111	Hewitt, H. G.	College Pharmacy, Univ. Wis.	Madison, Wis.	Monarda punctata	See No. 150
112	Heyl, F. W.	Upjohn Co.	Kalamazoo, Mich.	Ovarian constituents	See Nos. 20, 74, 105 and 268
113	Hiers, G. S.	Chemistry Bldg., Univ. Ill.	Urbana, Ill.	Chaulmoogric acid derivatives	See No. 2
114	Hill, A. J.	Sterling Laboratory, Yale University	New Haven, Conn.	Local anesthetics, hypnotics etc.	See Nos. 62, 148, 160, 196, 197, 212, 215 and 292
115	Hilton, S. L.	Retail Pharmacy	Washington, D. C.	U. S. P. & N. F. problems	
116	Hjort, A. M.	Parke, Davis & Co.	Detroit, Mich.	Parathyroid glands and calcium metabolism	See No. 192
117	Hoch, N. H.	Phila. Coll. Pharm., and Science	Philadelphia, Pa.	Digitalis	See No. 276
118	Hogstad, Anton	Biochem. Division, Univ. Minn.	St. Paul, Minn.	Physico - chemical constants of alkaloids	
119	Holmes, A. D.	E. L. Patch Co.	Boston, Mass.	Vitamines and nutritional diseases	See No. 200
120	Horstman, G.	College Pharmacy, Fordham Univ.	New York, N. Y.	Drug analysis	See No. 52
121	Houseman, P. A.	MacAndrews and Forbes Co.	Camden, N. J.	Constituents of licorice root	See No. 256
122	Howard, J. W.	Dept. of Chemistry, Univ. Montana	Missoula, Mont.	Tri - chlor - methyl and tri - brom - methyl alcohols	
123	Howell, E. V.	College Pharmacy, Univ. of N. C.	Chapel Hill, N. C.	Phytochemical problems	See Nos. 16, 85, 172, 208 and 264
124	Hoyt, L. F.	Larkin Co., Inc.	Buffalo, N. Y.	Diethylphthalate	See No. 97
125	Hudson, J. P.	College Pharmacy, Univ. of N. C.	Chapel Hill, N. C.	Male fern and allied plants	See No. 267

Index No.	Name.	Laboratory.	Town.	Subject.	Remarks.
126	Hunt, Reid	Medical School, Harvard Univ.	Boston, Mass.	Bio-assay of drugs	
127	Husa, W. J.	College Pharmacy, Univ. Florida	Gainesville, Fla.	Study of the rancidity of ointments	
				Promotors of enzyme action	
128	Hynes, J. F.	Phila. Coll. Pharm. and Science	Philadelphia, Pa.	Aspidium Felix-mas	See No. 276
129	Jenkins, G. L.	College Pharmacy, Univ. Wis.	Madison, Wis.	Chemistry of Datura Stramonium	See No. 150
130	Johnson, C. W.	College Pharmacy, Univ. Wash.	Seattle, Wash.	U. S. P. revision problems	
131	Johnson, Treat B.	Sterling Laboratory, Yale University	New Haven, Conn.	Internal antiseptics	See Nos. 89, 210 and 228
132	Jones, W. S.	E. R. Squibb & Sons	New York, N. Y.	Conductivity studies of magma of magnesia	See No. 190
133	Jordan, C. B.	College Pharmacy, Purdue Univ.	Lafayette, Ind.	Constituents of white vervain	See Nos. 27, 141, 142 and 296
				A morphine-aspirin compound	
				Precipitates of the U.S.P.	
134	Judd, A. F.	College Pharmacy, Univ. Pittsburgh	Pittsburgh, Pa.	Tincture of iodine from denatured alcohol, etc.	See No. 144
135	Kamm, Oliver	Parke, Davis & Co.	Detroit, Mich.	Chemical study of pituitrin	
136	Kamm, W. F.	Parke, Davis & Co.	Detroit, Mich.	Problems in synthetic chemistry	See No. 262
137	Katti, M. C. T.	Dept. of Chemistry, Univ. Ill.	Urbana, Ill.	Assay of cascara	See No. 13
138	Keelan, H. S.	E. R. Squibb & Sons	New York, N. Y.	Preparation of aromatic sulphonic acids	See No. 190
139	Kelly, E. F.	A. Ph. A. Offices	Baltimore, Md.	U. S. P. revision problems	
140	Kilmer, F. B.	Johnson & Johnson	New Brunswick, N. J.	Non-alcoholic menstrua for vegetable drugs	
				The mydriatic solanums	
141	Klemme, C. J.	College Pharmacy, Purdue Univ.	Lafayette, Ind.	Toxic ingredients of white snake root	See No. 133
142	Klemme, Margaret	College Pharmacy, Purdue Univ.	West Lafayette, Ind.	A morphine-aspirin compound	See No. 133
143	Kober, P. A.	G. D. Searle & Co.	Chicago, Ill.	Arsphenamines	See Nos. 147 and 226
				Bismuth compounds	
				Nephelometry	See Nos. 18, 48, 68, 134, 145, 170, 182, 209, 238, 242, 243, 244 and 266
144	Koch, J. A.	Coll. Pharm. Univ. Pittsburgh	Pittsburgh, Pa.	General Pharmaceutical problems	
145	Koerner, G. E.	College Pharmacy, Univ. Pittsburgh	Pittsburgh, Pa.	Aesculin from buckeye seeds	See Nos. 134 and 144
146	Konnerth, R. A.	E. R. Squibb & Sons	New York, N. Y.	Manufacture of aromatic fluid extract of cascara by method of U. S. P. X	See No. 190
147	Korn, Theodore	G. D. Searle & Co.	Chicago, Ill.	See Kober	
148	Krach, D. F.	Sterling Laboratory, Yale University	New Haven, Conn.	Hypnotics and local anesthetics	See No. 114
149	Krantz, J. C.	College Pharmacy, Univ. Maryland	Baltimore, Md.	Emulsions	
				Effect of polarized light on certain medicaments	
				Electrometric assay of alkaloidal drugs	
150	Kremers, Edward	College Pharmacy, Univ. Wis.	Madison, Wis.	Phytochemical and bibliographical research	See Nos. 19, 26, 34, 37, 39, 70, 71, 86, 102, 107, 111, 129, 156, 173, 205, 270 and 273
151	Kyser, E. V.	College Pharmacy, Univ. of N. C.	Chapel Hill, N. C.	Studies of volatile and fixed oils	See Nos. 3 and 79

Index No.	Name.	Laboratory.	Town.	Subject.	Remarks.
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188	Netz, E. V.	College Pharmacy, Univ. Minn.	Minneapolis, Minn.	See Rogers	
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243	Sister M. Dolorosa	College Pharmacy, Univ. Pittsburgh	Pittsburgh, Pa.	Studies of the urease assay of urea	See Nos. 144 and 209
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278	Volweiler, E. H.	Abbott Laboratories	Chicago, Ill.	Problems in synthetic chemical medicaments	See Nos. 99, 257 and 277
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289	Wong, Violet	College Pharmacy, Univ. Wash.	Seattle, Wash.	Dispensing cod liver oil	See No. 152
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291	Wulling, F. J.	College Pharmacy, Univ. Minnesota	Minneapolis, Minn.	Educational research problems	
292	Wyckoff, Lillian	Sterling Chem. Laboratory, Yale Univ.	New Haven, Conn.	Hypnotics	See No. 114
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A HALF CENTURY OF THE NATIONAL FORMULARY 1880–1930. TITLES, SYNONYMS AND ABBREVIATIONS.

BY H. A. LANGENHAN.*

PREFATORY REMARKS.

In the course of the study of the U. S. Pharmacopœia, a complete index of the titles, synonyms and abbreviations of all revisions since and including the edition of 1820 was prepared. This was published by the *University of Wisconsin Pharmaceutical Experiment Station* under the title "One Hundred Years of the U. S. Pharmacopœia 1820–1920, Titles, Synonyms and Abbreviations." Transfers from the U. S. P. to the N. F. and vice versa were indicated in the footnotes. This necessitated an index of a similar nature of the first four editions of the National Formulary. With the appearance of the N. F. V, a half century of the N. F. has been completed and it was deemed feasible to complete the index as a supplement to the first one. Transfers from the N. F. to the U. S. P. or, vice versa, are again included and as a result the "official" history of many items covers a century.

The two compilations have been found to be of no little assistance in teaching pharmacy by those who have had access to both and the feeling prevailed that other teachers might find the two equally useful.

The numbers at the top of the columns indicate the date of the decennial revision. The date of impression is not used as this is confusing and offers no special advantage. Hence the year of the Convention of the Pharmacopœia is given as this also represents that of the N. F. Thus the first number 20 represents 1820 and the last number 20 represents 1920. In the case of the 1830 conventions, the number with the asterisk indicates the Pharmacopœia published by the New York convention, the other that of the Philadelphia convention. The capitals in the columns stand for, Latin title (L), English title (E), Synonym (S), Abbreviation (A). The principal order of the primes is the alphabetical order of the Latin titles of the latest edition in which that title (not necessarily item) is official. Thus, *e. g.*, *Aqua Sedativa* is replaced by *Lotio Ammoniacalis Camphorata*. Changes in official Latin titles, also interchanges with the U. S. P., are recorded in the footnotes.

N. F. Titles, Synonyms and Abbreviations.	Issues of U. S. P. and N. F.†											
	20	30	30*	40	50	60	70	80	90	00	10	20
ACETUM AROMATICUM	..	..	..	..	..	..	..	L	L	L	L	L
Aromatic Vinegar	..	..	..	..	..	..	..	E	E	E	E	E
Acet. Arom	..	..	..	..	..	..	..	..	..	..	A	A
ACETUM LOBELIÆ	..	..	..	..	..	1	1	1	L	L	..	..
Vinegar of Lobelia	..	..	..	..	..	..	..	..	E	E	..	..
ACETUM OPII	2	2	2	2	2	2	2	2	2	2	L	..
Vinegar of Opium	..	..	..	..	..	..	..	..	..	..	E	..
Acet. Opii	..	..	..	..	..	..	..	..	..	..	A	..

* Associate Professor of Pharmacy, University of Washington College of Pharmacy.

† The dates of the revisions of the U. S. Pharmacopœia are given and the National Formulary which most closely correspond, thus the column under 1910 refers to N. F. IV and 1920 to N. F. V., etc. References to the U. S. P. titles are designated by numerals; those to the National Formulary by lower case letters, in neither case by superior numerals or letters. Other explanations will be found in Prefatory Remarks.

1—See **ACETUM LOBELIÆ**, U. S. P. 2—See **ACETUM OPII**, U. S. P.

N. F. Titles, Synonyms and Abbreviations.	Issues of U. S. P. and N. F.† 20	30	30*	40	50	60	70	80	90	00	10	20
ACETUM SANGUINARIÆ	..	..	..	..	..	3	3	3	L	L	..	..
Vinegar of Sanguinaria	..	..	..	..	..	..	..	..	E	E	..	..
ACIDUM CITRICUM SACCHARATUM	..	..	..	..	..	..	..	..	L	L	..	..
Saccharated Citric Acid	..	..	..	..	..	..	..	..	E	E	..	..
ACIDUM HYPOPHOSPHOROSUM DILUTUM	..	..	..	..	..	..	..	L	L	4	4	..
Diluted Hypophosphorous Acid	..	..	..	..	..	..	..	E	E	..	..	..
ACIDUM METAPHOSPHORICUM DILUTUM	..	..	..	..	..	..	..	L	L	L	..	..
Diluted Metaphosphoric Acid	..	..	..	..	..	..	..	E	E	E	..	..
Acidum Phosphoricum Glaciale Dilutum	..	..	..	..	..	..	..	S	S	S	..	..
Dil. Glacial Phosphoric Acid	..	..	..	..	..	..	..	S	S	S	..	..
ACIDUM TARTARICUM SACCHARATUM	..	..	..	..	..	..	..	..	L	L	..	..
Saccharated Tartaric Acid	..	..	..	..	..	..	..	..	E	E	..	..
AMPULLÆ CAFFEINÆ SODIO-BENZOATIS	..	..	..	..	..	..	..	..	..	..	..	L
Ampuls of Caffein Sodio-Bensoate	..	..	..	..	..	..	..	..	..	..	..	E
Ampul. Caff. Sod.-Benz.	..	..	..	..	..	..	..	..	..	..	..	A
AMPULLÆ CAMPHORÆ	..	..	..	..	..	..	..	..	..	..	..	L
Ampuls of Camphor	..	..	..	..	..	..	..	..	..	..	..	E
AMPULLÆ EMETINÆ HYDROCHLORIDI	..	..	..	..	..	..	..	..	..	..	..	L
Ampuls of Emetine Hydrochloride	..	..	..	..	..	..	..	..	..	..	..	E
Ampul. Emet. Hydrochl.	..	..	..	..	..	..	..	..	..	..	..	A
AMPULLÆ IODI	..	..	..	..	..	..	..	..	..	..	..	L
Ampuls of Iodine	..	..	..	..	..	..	..	..	..	..	..	E
Iodine Swabs	..	..	..	..	..	..	..	..	..	..	..	S
Ampul. Iodi	..	..	..	..	..	..	..	..	..	..	..	A
AMPULLÆ QUININÆ ET UREÆ HYDROCHLORIDI	..	..	..	..	..	..	..	..	..	..	..	L
Ampuls of quinine and Urea Hydrochloride	..	..	..	..	..	..	..	..	..	..	..	E
Ampul. Quin. et Urea. Hydrochl.	..	..	..	..	..	..	..	..	..	..	..	A
AMPULLÆ QUININÆ DIHYDROCHLORIDI	..	..	..	..	..	..	..	..	..	..	..	L
Ampuls of Quinine Dihydrochloride	..	..	..	..	..	..	..	..	..	..	..	E
Ampul. Quin. Dihydrochl.	..	..	..	..	..	..	..	..	..	..	..	A
AMPULLÆ SODII CACODYLATIS	..	..	..	..	..	..	..	..	..	..	..	L
Ampuls of Sodium Cacodylate	..	..	..	..	..	..	..	..	..	..	..	E
Ampul. Sod. Cacodyl.	..	..	..	..	..	..	..	..	..	..	..	A
AMYLUM IODATUM	..	..	..	..	..	..	5	L	L	..	..	..
Iodized Starch	..	..	..	..	..	..	..	..	E	E	..	..
AQUA CHLOROFORMI	..	..	..	..	..	..	L	6	6	6	6	
Chloroform Water	..	..	..	..	..	..	E	..	..	..	..	..
AQUA HAMAMELIDES	..	..	..	..	..	..	..	L	7	7	L	
Hamamelis Water	..	..	..	..	..	..	E	E	..	..	E	
Witchhazel Water	..	..	..	..	..	..	S	S	..	..	S	
Witchhazel Extract	..	..	..	..	..	..	S	S	..	..	..	..
AQUA HAMAMELIDES	..	..	..	..	..	..	L	..	..	..	..	..
Distilled Extract of Witch Hazel	..	..	..	..	..	..	..	..	..	..	..	S
Aq. Hamam.	..	..	..	..	..	..	..	..	..	..	..	A
AQUA PHENOLATA	..	..	..	..	..	8	..	..	..	L	L	
Phenolated Water	..	..	..	..	..	..	..	..	..	E	E	
Carbolic Acid Water	..	..	..	..	..	..	..	..	..	S	S	

3—See **ACETUM SANGUINARIÆ**, U. S. P.
4—See **ACIDUM HYPOPHOSPHORUM DILUTUM**, U. S. P.
5—See **AMYLUM IODATUM**, U. S. P.
6—See **AQUA CHLOROFORMII**, U. S. P.
7—See **AQUA HAMAMELIDES**, U. S. P.

N. F. Titles, Synonyms and Abbreviations.	Issues of U. S. P. and N. F.†												
	20	30	30*	40	50	60	70	80	90	00	10	20
Phenoli Solutio P. I.	..	..	..	..	..	..	..	..	..	..	S	S
Aq. Phenol	..	..	..	..	..	..	..	..	..	..	..	A
AQUA SEDATIVA	..	..	..	..	..	..	..	L	L	L	a	a
Sedative Water	..	..	..	..	..	..	..	E	E	E	..	..
Lotio Ammoniacalis Camphorata	..	..	..	..	..	..	..	S	S	S	..	..
Eau Sédative de Raspail	..	..	..	..	..	..	..	S	S	S	..	..
BALSAMUM TRAUMATICUM	..	..	..	..	..	..	..	L	L	L	..	..
Traumatic Balsam	..	..	..	..	..	..	..	E	E	E	..	..
Turlingtons Balsam	..	..	..	..	..	..	..	S	S	S	..	..
Friars Balsam	..	..	..	..	..	..	..	S	S	S	..	..
BISMUTHI OXIDUM HYDRATUM	..	..	..	..	..	..	..	L	L	L	..	..
Hydrated Oxide of Bismuth	..	..	..	..	..	..	..	E	E	E	..	..
BOROGLYCERINUM	..	..	..	..	..	..	..	L	L	L	..	..
Boroglycerin	..	..	..	..	..	..	..	E	E	E	..	..
Glyceryl Borate	..	..	..	..	..	..	..	S	S	S	..	..
Boroglyceride	..	..	..	..	..	..	..	S	S	S	..	..
CAFFEINÆ CITRAS EFFERVESCENS	..	..	..	..	..	..	..	L	9	9	9	..
Effervescent Citrate of Caffein	..	..	..	..	..	..	..	E	..	..	..	..
CAFFEINÆ SODIO-BENZOAS	..	..	..	..	..	..	..	L	L	L	10	10
Caffeine Sodio-Benzoate	..	..	..	..	..	..	..	E	E	E	..	..
CAFFEINÆ SODIO SALICYLAS	..	..	..	..	..	..	..	L	L	L	L	L
Caffeine Sodio Salicylate	..	..	..	..	..	..	..	E	E	E	E	E
Caff. Sod.-Sal.	..	..	..	..	..	..	..	..	..	..	A	A
CARBASUS CARBOLATA	..	..	..	..	..	..	..	L	L	..	..	..
Carbolized Gauze	..	..	..	..	..	..	..	E	E	..	..	..
CARBASUS IODOFORMATA	..	..	..	..	..	..	..	L	L	..	..	..
Iodoform Gauze	..	..	..	..	..	..	..	E	E	..	..	..
CATAPLASMA KAOLINI	..	..	..	..	..	..	..	..	..	11	L	L
Cataplasm of Kaolin	..	..	..	..	..	..	..	..	..	..	E	E
Catapl. Kaolin	..	..	..	..	..	..	..	..	..	..	A	A
CERATUM CAMPHORÆ	..	..	..	..	..	..	..	12	12	12	L	L
Camphor Cerate	..	..	..	..	..	..	..	..	..	..	E	E
Cerat. Camph.	..	..	..	..	..	..	..	..	..	..	A	A
CERATUM CAMPHORÆ COMPOSITUM	..	..	..	..	..	..	..	L	L	L	..	..
Compound Camphor Cerate	..	..	..	..	..	..	..	E	E	E	..	..
Ceratum Camphoratum	..	..	..	..	..	..	..	S	S	S	..	..
Camphor Ice	..	..	..	..	..	..	..	S	S	S	..	..
CERATUM CETACEI	..	13	..	13	13	13	13	13	13	L	..	..
Spermaceti Cerate	..	..	..	..	..	..	..	..	..	E	..	..
CERATUM EXTRACTI CANTHARIDIS	..	..	..	..	..	14	14	14	L	L	..	..
Cerate of Extract of Cantharides	..	..	..	..	..	..	..	..	E	E	..	..
CERATUM PLUMBI SUBACETATIS	15	15	15	15	15	15	15	15	15	15	L	L
Cerate of Lead Subacetate	..	..	..	..	..	..	..	..	..	..	E	E
Goulard's Cerate	..	..	..	..	..	..	..	..	..	..	S	S

8—See **AQUA ACIDI CARBOLICI**, U. S. P.
a—See **LOTIO AMMONIACALIS CAMPHORATA**, N. F.
9—See **CAFFEINÆ CITRAS EFFERVESCENS**, U. S. P.
10—See **CAFFEINÆ SODIO BENZOAS**, U. S. P.
11—See **CATAPLASMA KAOLINI**, U. S. P.
12—See **CERATUM CAMPHORÆ**, U. S. P.
13—See **CERATUM CETACEI**, U. S. P.
14—See **CERATUM EXTRACTI CANTHARIDES**, U. S. P.

N. F. Titles, Synonyms and Abbreviations.	Issues of U. S. P. and N. F.† 20	30	30*	40	50	60	70	80	90	00	10	20
Cerat. Plumb. Subacet.	..	..	..	..	..	..	..	..	..	..	A	A
CERATUM RESINÆ COMPOSITUM	16	16	16	16	16	16	16	..	..	16	L	L
Compound Rosin Cerate	..	..	..	..	..	..	..	..	..	..	E	E
Deshler's Salve	..	..	..	..	..	..	..	..	..	..	S	S
Cerat. Resin. Co.	..	..	..	..	..	..	..	..	..	..	A	A
CERATUM SABINÆ	17	17	17	17	17	17	17	17	L	L	..	..
Savine Cerate	..	..	..	..	..	..	..	..	E	E	..	..
CHARTA CANTHARIDIS	..	..	..	..	..	..	18	18	L	L	..	..
Cantharides Paper	..	..	..	..	..	..	..	..	E	E	..	..
CHARTA POTASSII NITRATIS	..	..	..	..	..	..	..	19	19	L	L	L
Potassium Nitrate Papers	..	..	..	..	..	..	..	..	..	E	E	E
Chart. Pot. Nit.	..	..	..	..	..	..	..	..	..	..	A	A
CHLORAL CAMPHORATUM	..	..	..	..	..	..	..	L	L	L	L	L
Camphorated Chloral	..	..	..	..	..	..	..	E	E	E	E	E
Chloral et Camphora	..	..	..	..	..	..	..	S	S	S	..	..
Chloral and Camphor	..	..	..	..	..	..	..	S	S	S	..	..
Chloral Camph.	..	..	..	..	..	..	..	..	..	..	A	A
COLLODION BITUMINIS SULPHONATI	..	..	..	..	..	..	..	..	..	..	..	L
Collodion of Sulphonated Bitumen	..	..	..	..	..	..	..	..	..	..	..	E
Collod. Bitum. Sulphon.	..	..	..	..	..	..	..	..	..	..	..	A
COLLODIUM IODI	..	..	..	..	..	..	..	..	..	..	L	..
Iodine Collodion	..	..	..	..	..	..	..	..	..	..	E	..
COLLODIUM IODATUM	..	..	..	..	..	..	..	L	L	L	..	..
Iodized Collodion	..	..	..	..	..	..	..	E	E	E	..	..
Collod. Iodi	..	..	..	..	..	..	..	..	..	..	A	..
COLLODIUM IODOFORMI	..	..	..	..	..	..	..	..	..	..	L	..
Iodoform Collodion	..	..	..	..	..	..	..	E	E	E	E	..
COLLODIUM IODOFORMATUM	..	..	..	..	..	..	..	L	L	L	..	..
Collod. Iodof.	..	..	..	..	..	..	..	..	..	..	A	..
COLLODIUM SALICYLICIUM COMPOSITUM	..	..	..	..	..	..	..	..	..	..	L	L
Compound Salicylic Collodion	..	..	..	..	..	..	..	..	..	..	E	E
COLLODIUM SALICYLATUM COMPOSITUM	..	..	..	..	..	..	..	L	L	L	..	..
Compound Salicylated Collodion	..	..	..	..	..	..	..	E	E	E	..	..
Corn Collodion	..	..	..	..	..	..	..	S	S	S	..	..
Collod. Sal. Co.	..	..	..	..	..	..	..	..	..	..	A	A
COLLODIUM STYPTICUM	..	..	..	..	..	..	..	20	20	20	L	L
Styptic Collodion	..	..	..	..	..	..	..	..	..	..	E	E
Collod. Stypt.	..	..	..	..	..	..	..	..	..	..	A	A
COLLODIUM TIGLII	..	..	..	..	..	..	..	..	L	L	L	..
Croton Oil Collodion	..	..	..	..	..	..	..	..	E	E	E	..
Collod. Tiglii	..	..	..	..	..	..	..	..	..	..	A	..
CONFECTIO ROSÆ	21	21	21	21	21	21	21	21	21	21	L	L
Confection of Rose	..	..	..	..	..	..	..	..	..	..	E	E
Confect. Ros.	..	..	..	..	..	..	..	..	..	..	A	A

15—See **CERATUM PLUMBI SUBACETATIS**, U. S. P.

16—See **CERATUM RESINÆ COMPOSITUM**, U. S. P.

17—See **CERATUM SABINÆ**, U. S. P.

18—See **CHARTA CANTHARIDIS**, U. S. P.

19—See **CHARTA POTASSII NITRATIS**, U. S. P.

20—See **COLLODIUM STYPTICUM**, U. S. P.

21—See **CONFECTIO ROSÆ**, U. S. P.

N. F. Titles, Synonyms and Abbreviations.	Issues of U. S. P. and N. F.†											
	20	30	30*	40	50	60	70	80	90	00	10	20
CONFECTIO SENNÆ	22	22	22	22	22	22	22	22	22	22	L	L
Confection of Senna	..	..	..	..	..	..	..	..	..	..	E	E
Confect. Senn.	..	..	..	..	..	..	..	..	..	..	A	A
CORDIALE RUBI FRUCTUS	..	..	..	..	..	..	..	L	L	L	L	..
Blackberry Cordial	..	..	..	..	..	..	..	E	E	E	E	..
Cord. Rubi Fruct.	..	..	..	..	..	..	..	..	..	..	A	..
CURATIO PARAFINI	..	..	..	..	..	..	..	..	..	..	..	L
Paraffin Dressing	..	..	..	..	..	..	..	..	..	..	..	E
Curat. Paraf.	..	..	..	..	..	..	..	..	..	..	..	A
DECOCTUM ALOES COMPOSITUM	..	..	..	..	..	..	..	L	L	L	..	..
Compound Decoction of Aloes	..	..	..	..	..	..	..	E	E	E	..	..
DECOCTUM CETRARIÆ	23	23	23	23	23	23	23	23	23	L	..	..
Decoction of Cetraria	..	..	..	..	..	..	..	..	..	E	..	..
DECOCTUM SARSAPARILLÆ COMPOSITUM	..	..	..	..	..	..	..	..	..	L	L	..
Compound Decoction of Sarsaparilla	..	..	..	..	..	..	..	..	..	E	E	..
DENTIFRICIUM	..	..	..	..	..	..	..	..	..	..	..	L
Dentifrice	..	..	..	..	..	..	..	..	..	..	..	E
Oxidizing Tooth Powder	..	..	..	..	..	..	..	..	..	..	..	S
Tooth Powder	..	..	..	..	..	..	..	..	..	..	..	S
Dentif.	..	..	..	..	..	..	..	..	..	..	..	A
DENTILIMENTUM ACONITI COMPOSITUM	..	..	..	..	..	..	..	..	..	..	..	L
Compound Dental Liniment of Aconite	..	..	..	..	..	..	..	..	..	..	..	E
Dentil. Aconit. Co.	..	..	..	..	..	..	..	..	..	..	..	A
DENTILINIMENTUM ACONITI ET IODI COMPOSITUM	..	..	..	..	..	..	..	..	..	..	..	L
Compound Dental Liniment of Aconite and Iodine	..	..	..	..	..	..	..	..	..	..	..	E
Dentil. Aconit. et Iod. Co.	..	..	..	..	..	..	..	..	..	..	..	A
ELIXIR ACIDI SALICYLICI	..	..	..	..	..	..	..	L	L	L	..	..
Elixir of Salicylic Acid	..	..	..	..	..	..	..	E	E	E	..	..
ELIXIR ADJUVANS	..	..	..	..	..	..	..	L	L	..	..	..
Adjuvant Elixir	..	..	..	..	..	..	..	E	E	..	..	..
ELIXIR ALETRIDIS COMPOSITUM	..	..	..	..	..	..	..	..	..	..	..	L
Compound Elixir of Aletris	..	..	..	..	..	..	..	..	..	..	..	E
Elix. Aletrid. Co.	..	..	..	..	..	..	..	..	..	..	..	A
ELIXIR AMMONII BROMIDI	..	..	..	..	..	..	..	L	L	L	L	L
Elixir of Ammonium Bromide	..	..	..	..	..	..	..	E	E	E	E	E
Elix. Ammon. Brom.	..	..	..	..	..	..	..	..	..	..	A	A
ELIXIR OF AMMONII VALERATIS	..	..	..	..	..	..	..	..	..	..	L	L
Elixir of Ammonium Valerate	..	..	..	..	..	..	..	..	..	..	E	E
ELIXIR AMMONII VALERIANATIS	..	..	..	..	..	..	..	L	L	L	..	..
Elixir Ammonii Valerianatis	..	..	..	..	..	..	..	..	..	..	S	S
Elixir of Ammonium Valerianate	..	..	..	..	..	..	..	E	E	E	..	..
Elix. Ammon. Valer.	..	..	..	..	..	..	..	..	..	..	A	A
ELIXIR AMMONII VALERIANATIS ET QUININÆ	..	..	..	..	..	..	..	L	L	L	..	..
Elixir of Ammonium Valerianate and Quinine	..	..	..	..	..	..	..	E	E	E	..	..
ELIXIR AMYGDALÆ COMPOSITUM	..	..	..	..	..	..	..	..	..	..	L	L
Compound Elixir of Almond	..	..	..	..	..	..	..	..	..	..	E	E
Elix. Amygdal. Co.	..	..	..	..	..	..	..	..	..	..	A	A

22—See **CONFECTIO SENNÆ**, U. S. P.

23—See **DECOCTUM CETRARIÆ**, U. S. P.

N. F. Titles, Synonyms and Abbreviations.	Issues of U. S. P. and N. F.† 20	30	30*	40	50	60	70	80	90	00	10	20
ELIXIR ANISI	..	..	..	..	..	..	..	L	L	L	L	L
Elixir of Anise	..	..	..	..	..	..	..	E	E	E	E	E
Aniseed Cordial	..	..	..	..	..	..	..	S	S	S	..	..
Elix. Anis.	..	..	..	..	..	..	..	..	..	..	A	A
ELIXIR APII GRAVEOLENTIS COMP.	..	..	..	..	..	..	..	L	L	L	..	..
Compound Elixir of Celery	..	..	..	..	..	..	..	E	E	E	..	..
ELIXIR AROMATICUM	..	..	..	..	..	..	..	L	24	24	24	24
Aromatic Elixir	..	..	..	..	..	..	..	E	..	..	..	..
ELIXIR AROMATICUM RUBRUM	..	..	..	..	..	..	..	..	..	..	L	L
Red Aromatic Elixir	..	..	..	..	..	..	..	..	..	..	E	E
Red Elixir	..	..	..	..	..	..	..	..	..	..	S	S
Elix. Arom. Rub.	..	..	..	..	..	..	..	..	..	..	A	A
ELIXIR AURANTII AMARI	..	..	..	..	..	..	..	..	..	b	L	L
Elixir of Bitter Orange	..	..	..	..	..	..	..	..	..	..	E	E
Elixir Curassao	..	..	..	..	..	..	..	..	..	..	..	S
ELIXIR BISMUTHI	..	..	..	..	..	..	..	L	L	L	L	..
Elixir of Bismuth	..	..	..	..	..	..	..	E	E	E	E	..
Elix. Bismuth	..	..	..	..	..	..	..	..	..	..	A	..
Elix. Bism.	..	..	..	..	..	..	..	..	..	..	..	A
ELIXIR BROMIDORUM QUINQUE	..	..	..	..	..	..	..	..	..	..	..	L
Elixir of Five Bromides	..	..	..	..	..	..	..	..	..	..	..	E
Elix. Bromid. Quinq.	..	..	..	..	..	..	..	..	..	..	..	A
ELIXIR BROMIDORUM TRIUM	..	..	..	..	..	..	..	..	..	..	..	L
ELIXIR TRIUM BROMIDORUM	..	..	..	..	..	..	..	..	..	..	L	..
Elixir Trium Bromidorum	..	..	..	..	..	..	..	..	..	..	..	S
Elixir of Three Bromides	..	..	..	..	..	..	..	..	..	..	E	E
Elix. Tri. Brom.	..	..	..	..	..	..	..	..	..	..	A	..
Elix. Brom. Tri.	..	..	..	..	..	..	..	..	..	..	..	A
ELIXIR BUCHU	..	..	..	..	..	..	..	L	L	L	L	L
Elixir of Buchu	..	..	..	..	..	..	..	E	E	E	E	E
Elix. Buchu	..	..	..	..	..	..	..	..	..	..	A	A
ELIXIR BUCHU COMPOSITUS	..	..	..	..	..	..	..	L	L	L	L	L
Compound Elixir of Buchu	..	..	..	..	..	..	..	E	E	E	E	E
Elix. Buchu Co.	..	..	..	..	..	..	..	..	..	..	A	A
ELIXIR BUCHU ET POTASSII ACETATIS	..	..	..	..	..	..	..	L	L	L	L	L
Elixir of Buchu and Potassium Acetate	..	..	..	..	..	..	..	E	E	E	E	E
Elix. Buchu et Pot. Acet.	..	..	..	..	..	..	..	..	..	..	A	A
ELIXIR BUCHU, JUNIPERI ET POTASSII ACETATIS	..	..	..	..	..	..	..	..	..	..	..	L
Elixir of Buchu, Juniper and Potassium Acetate	..	..	..	..	..	..	..	..	..	..	..	E
Elix. Buchu, Junip. et Pot. Acet.	..	..	..	..	..	..	..	..	..	..	..	A
ELIXIR CAFFEINÆ	..	..	..	..	..	..	..	L	L	L	..	..
Elixir of Caffeine	..	..	..	..	..	..	..	E	E	E	..	..
ELIXIR CALCII BROMIDI	..	..	..	..	..	..	..	L	L	L	L	..
Elixir of Calcium Bromide	..	..	..	..	..	..	..	E	E	E	E	..
ELIXIR CALCII ET SODII GLYCEROPHOSPHATUM	..	..	..	..	..	..	..	..	..	..	L	L
Elixir of Calcium and Sodium Glycerophosphates	..	..	..	..	..	..	..	..	..	..	E	E
ELIXIR GLYCEROPHOSPHATUM	..	..	..	..	..	..	..	..	..	L	..	..
Elixir Glycerophosphatum	..	..	..	..	..	..	..	..	..	..	S	S

24—See **ELIXIR AROMATICUM**, U. S. P.

b—Replacing **ELIXIR CURASSAO, CURACAO CORDIAL.**

N. F. Titles, Synonyms and Abbreviations.	Issues of U. S. P. and N. F.†											
	20	30	30*	40	50	60	70	80	90	00	10	20
Elixir of Glycerophosphates	..	..	..	..	..	..	..	..	..	E	..	..
Elix. Calc. et Sod. Glycerophos.	..	..	..	..	..	..	..	..	..	..	A	A
ELIXIR CALCII HYPOPHOSPHITIS	..	..	..	..	..	..	..	L	L	L	L	..
Elixir of Calcium Hypophosphite	..	..	..	..	..	..	..	E	E	E	E	..
Elix. Calc. Hypophos.	..	..	..	..	..	..	..	..	..	..	A	..
ELIXIR CALCII LACTOPHOSPHATIS	..	..	..	..	..	..	..	L	L	L	L	L
Elixir of Calcium Lactophosphate	..	..	..	..	..	..	..	E	E	E	E	E
Elix. Calc. Lactophos.	..	..	..	..	..	..	..	..	..	..	A	A
ELIXIR CARDAMOMI COMPOSITUM	..	..	..	..	..	..	..	..	..	..	L	L
Compound Elixir of Cardamon	..	..	..	..	..	..	..	..	..	..	E	E
Elix. Card. Co.	..	..	..	..	..	..	..	..	..	..	A	A
ELIXIR CARNIS ET FERRI	..	..	..	..	..	..	..	..	..	..	c	L
Elixir of Beef and Iron	..	..	..	..	..	..	..	..	..	..	..	E
Elix. Carn. et Ferr.	..	..	..	..	..	..	..	..	..	..	..	A
ELIXIR CASCARÆ SAGRADÆ	..	..	..	..	..	..	..	..	..	..	L	L
Elixir of Cascara Sagrada	..	..	..	..	..	..	..	..	..	E	E	E
Elixir of Cascara Sagrada	..	..	..	..	..	..	..	S	..	..	..	..
ELIXIR RHAMNI PURSHIANÆ	..	..	..	..	..	..	..	L	L	L	..	..
Elixir of Rhamnus Purshiana	..	..	..	..	..	..	..	E	E	E	..	..
Elix. Cascar. Sagr.	..	..	..	..	..	..	..	..	..	..	A	..
Elix. Casc. Sagr.	..	..	..	..	..	..	..	..	..	..	..	A
ELIXIR CASCARÆ SAGRADÆ COMPOSITUM	..	..	..	..	..	..	..	..	..	..	L	L
Compound Elixir of Cascara Sagrada	..	..	..	..	..	..	..	..	E	E	E	E
ELIXIR RHAMNI PURSHIANÆ COMPOSITUM	..	..	..	..	..	..	..	L	L	L	..	..
Elixir Rhamni Purshianæ Compositum	..	..	..	..	..	..	..	..	..	..	..	S
Elixir Laxativum	..	..	..	..	..	..	..	S	S	S	..	..
Laxative Elixir	..	..	..	..	..	..	..	S	S	S	S	S
Compound Elixir of Rhamnus Purshiana	..	..	..	..	..	..	..	E	..	..	..	..
Elixir Purgans	..	..	..	..	..	..	..	S	..	..	..	..
Elix. Cascar. Sagr. Co.	..	..	..	..	..	..	..	..	..	..	A	..
Elix. Casc. Sagr. Co.	..	..	..	..	..	..	..	..	..	..	..	A
ELIXIR CATARIÆ ET FŒNICULI	..	..	..	..	..	..	..	..	..	..	..	L
Elixir of Catnip and Fennel	..	..	..	..	..	..	..	..	..	..	..	E
Elix. Catar. et Fœnic.	..	..	..	..	..	..	..	..	..	..	..	A
ELIXIR CATHARTICUM COMPOSITUM	..	..	..	..	..	..	..	L	L	L	L	L
Compound Cathartic Elixir	..	..	..	..	..	..	..	E	E	E	E	E
Elix. Cathart. Co.	..	..	..	..	..	..	..	..	..	..	A	A
ELIXIR CHLORIDORUM	..	..	..	..	..	..	..	..	..	..	..	L
Elixir of Chlorides	..	..	..	..	..	..	..	..	..	..	..	E
Elixir of Four Chlorides	..	..	..	..	..	..	..	..	..	..	..	S
Elix. Chlorid.	..	..	..	..	..	..	..	..	..	..	..	A
ELIXIR CHLOROFORMI COMPOSITUM	..	..	..	..	..	..	..	L	L	L	..	..
Compound Elixir of Chloroform	..	..	..	..	..	..	..	E	E	E	..	..
ELIXIR CINCHONÆ ALKALOIDORUM	..	..	..	..	..	..	..	..	..	..	L	L
Elixir of Cinchona Alkaloids	..	..	..	..	..	..	..	..	..	..	E	E
ELIXIR CINCHONÆ	..	..	..	..	..	..	..	L	L	L	..	..
Elixir Cinchonæ	..	..	..	..	..	..	..	..	..	..	S	..
Elixir of Cinchona	..	..	..	..	..	..	..	E	E	E	..	..
Elixir Calisaya, Alkaloidal	..	..	..	..	..	..	..	..	..	..	S	S
Elixir Calisaya	..	..	..	..	..	..	..	S	S	S	..	..
Compound Elixir of Quinine	..	..	..	..	..	..	..	..	..	S	..	..
Elix. Cinchon. Alk.	..	..	..	..	..	..	..	..	..	..	A	A

c—Replacing **VINI CARNIS ET FERRI, N. F.**

N. F. Titles, Synonyms and Abbreviations.	Issues of U. S. P. and N. F.† 20	30	30*	40	50	60	70	80	90	00	10	20
ELIXIR CINCHONÆ ALKALOIDORUM ET FERRI	..	..	..	..	..	..	..	..	..	..	L	L
Elixir of Cinchona Alkaloids and Iron	..	..	..	..	..	..	..	..	..	..	E	E
ELIXIR CINCHONÆ ET FERRI	..	..	..	..	..	..	..	L	L	L	..	..
Elixir Cinchonæ et Ferri	..	..	..	..	..	..	..	..	..	..	S	..
Elixir of Cinchona and Iron	..	..	..	..	..	..	..	E	E	E	..	..
Ferrated Elixir of Calisaya, Alkaloidal	..	..	..	..	..	..	..	S	S	S	S	S
Elixir of Calisaya and Iron	..	..	..	..	..	..	..	S	S	S	..	..
Elix. Cinchon. et Ferr.	..	..	..	..	..	..	..	..	..	..	A	A
ELIXIR CINCHONÆ ALKALOIDORUM ET HYPOPHOSPHITUM	..	..	..	..	..	..	..	..	..	..	L	..
Elixir of Cinchona Alkaloids and Hypophosphites	..	..	..	..	..	..	..	..	..	..	E	..
ELIXIR CINCHONÆ ET HYPOPHOSPHITUM	..	..	..	..	..	..	..	L	L	L	..	..
Elixir Cinchonæ et Hypophosphitum	..	..	..	..	..	..	..	..	..	..	S	..
Elixir of Calisaya and Hypophosphites	..	..	..	..	..	..	..	S	S	S	..	..
Elixir of Cinchona and Hypophosphitus	..	..	..	..	..	..	..	E	E	E	..	..
Elixir of Calisaya, Alkaloidal with Hypophosphites	..	..	..	..	..	..	..	..	..	..	S	..
Elix. Cinchon. et Hypophos.	..	..	..	..	..	..	..	..	..	..	A	..
ELIXIR CINCHONÆ ALKALOIDORUM, FERRI, BISMUTHI ET STRYCHNINÆ	..	..	..	..	..	..	..	..	..	..	L	L
Elixir of Cinchona Alkaloids, Iron, Bismuth and Strychnine	..	..	..	..	..	..	..	..	..	..	E	E
ELIXIR CINCHONÆ, FERRI, BISMUTHI ET STRYCHNINÆ	..	..	..	..	..	..	..	L	L	L	..	..
Elixir Cinchonæ, Ferri, Bismuthi et Strychninæ	..	..	..	..	..	..	..	..	..	..	S	S
Elixir of Cinchona, Iron, Bismuth and Strychnine	..	..	..	..	..	..	..	E	E	E	..	..
Elixir of Calisaya, Alkaloidal, with Iron, Bismuth and Strychnine	..	..	..	..	..	..	..	..	..	..	S	S
Elixir of Calisaya, Iron, Bismuth and Strychnine	..	..	..	..	..	..	..	S	S	S	..	..
Elix. Cinchon. Ferr. Bism. et Strych.	..	..	..	..	..	..	..	..	..	..	A	A
ELIXIR CINCHONÆ ALKALOIDORUM, FERRI ET BISMUTHI	..	..	..	..	..	..	..	..	..	..	L	..
Elixir of Cinchona Alkaloids, Iron and Bismuth	..	..	..	..	..	..	..	..	..	..	E	..
ELIXIR CINCHONÆ, FERRI ET BISMUTHI	..	..	..	..	..	..	..	L	L	L	..	..
Elixir Cinchonæ, Ferri et Bismuthi	..	..	..	..	..	..	..	..	..	..	S	..
Elixir of Cinchona, Iron and Bismuth	..	..	..	..	..	..	..	E	E	E	..	..
Elixir Calisaya, Alkaloidal with Iron and Bismuth	..	..	..	..	..	..	..	..	..	..	S	..
Elixir of Calisaya, Iron and Bismuth	..	..	..	..	..	..	..	S	S	S	..	..
Elix. Cinchon. Ferr. et Bism.	..	..	..	..	..	..	..	..	..	..	A	..
ELIXIR CINCHONÆ ALKALOIDORUM, FERRI ET CALCII LACTOPHOSPHATIS	..	..	..	..	..	..	..	..	..	..	L	..
Elixir of Cinchona Alkaloids, Iron and Calcium Lactophosphates	..	..	..	..	..	..	..	..	..	..	E	..
ELIXIR CINCHONÆ, FERRI ET CALCII LACTOPHOSPHATIS	..	..	..	..	..	..	..	L	L	L	..	..
Elixir Cinchonæ, Ferri et Calcii Lactophosphatis	..	..	..	..	..	..	..	..	..	..	S	..
Elixir of Cinchona, Iron and Calcium Lactophosphate	..	..	..	..	..	..	..	E	E	E	..	..
Elixir of Calisaya, Alkaloidal, Iron and Lactophosphate of Lime	..	..	..	..	..	..	..	..	..	..	S	..
Elixir of Calisaya, Iron and Lactophosphate of Lime	..	..	..	..	..	..	..	S	S	S	..	..
Elix. Cinchon. Ferr. et Calc. Lactophos.	..	..	..	..	..	..	..	..	..	..	A	..
ELIXIR CINCHONÆ ALKALOIDORUM, FERRI ET PEPSINI	..	..	..	..	..	..	..	..	..	..	L	..
Elixir of Cinchona Alkaloids, Iron and Pepsin	..	..	..	..	..	..	..	..	..	..	E	..

(To be Continued)

ASSOCIATION BUSINESS

AD INTERIM BUSINESS OF THE COUNCIL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, 1925–1926.

Office of the Secretary, 10 West Chase St., Baltimore, Md.

LETTER NO. 14

July 15, 1926.

To the Members of the Council:

102. Motion No. 49 (See Council Letter No. 13, page 593) has been carried and the tentative program is approved.

103. Motion No. 50 (See Council Letter No. 13, page 593) has been carried and the parties mentioned therein have been notified.

104. Motion No. 51 (See Council Letter No. 13, page 594) and Motion No. 52 (See Council Letter No. 12, page 594) have been carried. Applicants for membership numbered 142 to 173 inclusive, and applicants for membership numbered H-256 to H-259 inclusive are therefore declared elected.

105. President Walton has appointed F. B. Kilmer of New Jersey, W. Bruce Philip of California, W. B. Day of Illinois, and H. E. Duncan of Alabama as associate members of the Committee on Pharmacy Week. (See Motion No. 41, Council Letter No. 11, page 406). The appointment of Robert J. Ruth as Chairman of this Committee has been announced.

106. It is with deep regret and with full appreciation of our loss that the death of Dr. H. M. Whelpley is thus officially announced to the members of the Council and to other members of the Association. The Association was represented at the funeral ceremonies by the following committee appointed by President Walton: C. F. G. Meyer, Charles Gietner, William Mittelbach, D. V. Whitney and C. E. Caspari. Other officers and members of the Association were also present.

The following letter has been received from President Walton:

> "The Association and the Council has suffered an irreparable loss through the sudden death of our esteemed member, Dr. Henry M. Whelpley, in Kansas City, Mo., last Saturday. His service to these bodies can hardly be estimated or appraised. It represents thirty-seven years' of unusual devotion to the welfare of the AMERICAN PHARMACEUTICAL ASSOCIATION
>
> "His great love for the organization made him an ever ready and outstanding exponent of its ideals on all occasions. He was a man of rare executive ability, wide knowledge and splendid judgment. As President, Treasurer and Member of the Council, and in many other positions, his official duties were executed with wisdom, efficiency and fidelity rarely equalled and unsurpassed by an officer of any organization. The A. PH. A. is indeed poorer for his taking away.
>
> "I feel that the Council should record, by suitable resolution, its sense of loss at the untimely death of our beloved colleague, and the esteem in which he was held by this body. Therefore, I move that the Chairman of the Council appoint a Committee to Draft Resolutions on the death of Dr. Henry Milton Whelpley."

(*Motion No. 53.*) *It is moved by Walton that the Chairman of the Council appoint a committee to draft resolutions on the death of Dr. Henry Milton Whelpley.*

107. The following letter has been received from Chairman DuMez of the Committee on Publications:

> "I am sending you herewith copies of my replies to requests received from Messrs. Lea & Febiger to use the text of the N. F. V for partial reproduction in a "Manual on Qualitative Analysis" by Theodore J. Bradley and from Eli Lilly and Company to use the text of the N. F. V for partial reproduction in a "Guide to the Official Organic Drugs" issued by that firm.
>
> "Such use of the National Formulary IV was made in previous editions of each of these publications and I see no reason why permission should not be granted again. I am therefore recommending to the Council that both of these requests be granted."

(*Motion No. 54.*) *It is moved by DuMez that Lea & Febiger and Eli Lilly and Company be granted permission to use the text of the N. F. V for partial reproduction in a Manual on Qualitative Analysis by T. J. Bradley and in a Guide to the Official Organic Drugs, respec-*

tively, and at the usual charge of $5.00 in each case.

108. The following letter was received from Mr. H. C. Christensen:

"The members of the AMERICAN PHARMACEUTICAL ASSOCIATION are familiar with the results of the Survey of Pharmacy conducted by Dr. W. W. Charters and his coworkers during the past three years. The funds for this work were provided by the Commonwealth Fund.

"It is also generally known that the survey covered only the field of professional pharmacy, and that no attention was given to the commercial phases of our calling.

"There has been a very general desire on the part of those interested in the survey to extend its scope to administrative or commercial pharmacy and Dr. Charters has consented to continue the study along such lines if the necessary funds are provided.

"The Commonwealth Fund felt that when it had made its contribution to the study of this profession, the other friends of the profession would see the value of carrying on the second study.

"Dr. Charters' idea is to make a careful analysis of the administrative problems of the pharmacist and to call on experts in subjects such as salesmanship, advertising, store management, buying goods, turnover, etc. The result of this analysis will then be available to the colleges of pharmacy and to the pharmacists generally.

"The sum of $15,000 a year for three years will need to be underwritten. Of this amount $6500 a year has been definitely promised, and $3500 a year in addition is clearly in sight. These sums have been subscribed in lots of a thousand dollars a year by each of a few prominent manufacturers who have been approached by the National Association of Retail Druggists. The National Association of Boards of Pharmacy has subscribed $500 a year for three years. It is felt that the AMERICAN PHARMACEUTICAL ASSOCIATION should be represented as a supporter of this study by an appropriation of $500 a year for three years.

"Therefore, I desire to offer a motion before the Council of the ASSOCIATION that the sum of $500 a year for three years be appropriated for the purpose of carrying on the Survey of Pharmacy along the lines indicated and that this sum be placed at the disposal of Dr. Charters for this purpose."

This letter was forwarded to Chairman Koch of the Committee on Finance who writes as follows:

"The motion appropriating $500 annually for 3 years to aid in the study of commercial pharmacy has the approval of the Committee on Finance."

(*Motion No. 55.*) *It is moved by Christensen that the American Pharmaceutical Association appropriate the sum of five hundred dollars annually for three years for the purpose of carrying on the survey of pharmacy along the lines indicated in his letter and that this sum be placed at the disposal of Dr. W. W. Charters for this purpose.* If there is objection the vote will be considered tentative.

109. For the information of the members of the Council it is stated that the remaining 18,000 copies of Series A of the N. F. V have been delivered to the Chemical Catalog Company.

The enclosed addition to "Special Notices" was enclosed in more than 13,000 copies of the 18,000 last delivered and a supply of them furnished to the Chemical Catalog Company. The notice was also given the widest possible publicity through the coöperation of the Pharmaceutical Press.

110. Applicants for Membership. The following applications properly endorsed and accompanied by the first year's dues have been received:

No. 174, Mary Abramovitz, Leechburg, Pa.; No. 175, Morris Goodwin Acton, Jr., Salem, N. J.; No. 176, M. F. Bane, 1206 Margaret St., Munhall, Pa.; No. 177, Alexander Walker Banner, Jr., 1312 Wesley St., Wilkinsburg, Pa.; No. 178, Thomas Henry Baysham, 2827 Summer St., Pittsburgh, Pa.; No. 179, M. F. Beyer, 2520 Sixth Ave., Altoona, Pa.; No. 180, Grant Enos Brown, 200 Ridge St., S. Brownsville, Pa.; No. 181, James Carey Butler, 17 N. 5th St., Duquesne, Pa.; No. 182, Frank Bernard Chesney, 1832 Carson St., Pittsburgh, Pa.; No. 183, John Geyer Cook, 249 Penn. Ave., Rochester, Pa.; No. 184, Anna S. Daniels, 525—9th Avenue, Munhall, Pa.; No. 185, Lewis W. Davis, 5829 Hobart St., Pittsburgh, Pa.; No. 186, Charles L. Depp, 1334 Hanlon St., Pittsburgh, Pa.; No. 187, John Peter Stephen Doyle, 2306 Perrysville Ave., N. S., Pittsburgh, Pa.; No. 188, Albert K. Epstein, 5 S. Wabash Ave., Chicago, Ill.; No. 189, Joseph Onorio Errigo, 614 Filbert St., Curwensville, Pa.; No. 190, Nathan Falk, 122

North Broadway, Scottdale, Pa.; No. 191, Stanton Harvey Frank, 115 Carnegie Place, Pittsburgh, Pa.; No. 192, A. Dock Frey, 303 S. 6th St., Chambersburg, Pa.; No. 193, Samuel Goldblatt, 314 Helen St., McKees Rocks, Pa.; No. 194, Roy Joseph Graft, 3055 Franklin Blvd., Chicago, Ill.; No. 195, Herman Louis Grimm, 2111 Rockledge St., N. S., Pittsburgh, Pa.; No. 196, Garland Wilmot Harsha, 1182 Penn Ave., East Liverpool, O.; No. 197, Donald C. Hartsock, 4116 Main St., Pittsburgh, Pa.; No. 198, Edward Charles Ifft, 3102 Iowa St., Pittsburgh, Pa.; No. 199, D. W. Johnston, 620 Taylor St., New Castle, Pa.; No. 200, Maurice David Kansky, 241 Maverick St., East Boston, Mass.; No. 201, Herbert Krause, 108 Prospect St., S. Brownsville, Pa.; No. 202, William Edward Kugger, 5962 Alden St., Pittsburgh, Pa.; No. 203, Manuel Maurice Lazear, 309 W. Hutchinson Ave., Edgewood, Pa.; No. 204, Carl Jacob Lefkowitz, 25 Wellsford St., Pittsburgh, Pa.; No. 205, Robert V. Lew, 110 Hornaday Rd., Carrick, Pa.; No. 206, Edwin E. Lichtenstul, 6312 Forward Ave., Pittsburgh, Pa.; No. 207, Cline J. MacGregor, 130 Beltzhoover Ave., Pittsburgh, Pa.; No. 208, Tomoichi Machida, Hilo, Hawaii; No. 209, Eugene T. McCabe, Jr., 7432 Idlewild St., Pittsburgh, Pa.; No. 210, Ronald Ray McCandless, 439 N. Bliff St., Butler, Pa.; No. 211, Roland Everett Mick, 422 State St., Wilson, Pa.; No. 212, Robert Nikolas Mamub, 27 Iron St., Johnstown, Pa.; No. 213, Abraham Alex Martin, 4419 Milgate St., Pittsburgh, Pa.; No. 214, Allan Martin, 2621 Tilbury St., Pittsburgh, Pa.; No. 215, Evelyn Meyer, 835 Washington Ave., Carnegie, Pa.; No. 216, Frank D. Moser, 180 Grandin Ave., Crafton, Pa.; No. 217, Richard Chester Mounts, 149 Hall Ave., Washington, Pa.; No. 218, Albert Keays North, London, Ont., Canada; No. 219, Isadore Numerosky, 619 Ninth Ave., Munhall, Pa.; No. 220, Des Palansky, 803 Somerset Ave., Windber, Pa.; No. 221, Harold Tyle Perry, 798 Anaheim St., Pittsburgh, Pa.; No. 222, Harold Pursel, Burnham, Pa.; No. 223, David Radner, 5510 Gladys Ave., Chicago, Ill.; No. 224, Harrison Collner Rimer, 700 Main St., Clarion, Pa.; No. 225, Lewis Galizia Sarcinella, 1056 Spearmen Ave., Farrell, Pa.; No. 226, Earl Conrad Schnusikey, 1726 Realty Avenue, Pittsburgh, Pa.; No. 227, Charles J. Simon, 420 Mt. Troy Road, Pittsburgh, Pa.; No. 228, Sister Mary Mildred Selzer, St. Johns General Hospital, McClure Ave., Pittsburgh, Pa.; No. 229, Sister M. Dolarosa Bayle, Forth-fifth St., St. Francis Hospital, Pittsburgh, Pa.; No. 230, Sister M. Aquin Steinkirchner, St. Francis Hospital, Pittsburgh, Pa.; No. 231, Frank H. Smith, 437 Second St., Monongahela, Pa.; No. 232, Joseph Charles Szarzyuski, 815 Broadway, McKees Rocks, Pa.; No. 233, Stanley Samuel Taub, 319 East 121 St., New York, N. Y.; No. 234, Roy Stanley Thomas, 428 Ridge Ave., New Kensington, Pa.; No. 235, Charles Tobin, 224 Keystone Ave., Cresson, Pa.; No. 236, Charles Turetzky, 96 South 4th St., Brooklyn, N. Y.; No. 237, Joseph Adam Wagner, 528 Speer St., Belle Vernon, Pa.; No. 238, James Herschell Walker, Carter, Okla.; No. 239, George H. Wilson, 237—45th St., Pittsburgh, Pa.; No. 240, Donald Woodrow, 202 Archeir Lane, Burgettstown, Pa.

(*Motion No. 56.*) *Vote on applications for active membership in the American Pharmaceutical Association.*

111. Applicants for Membership on Account of Contributions to the Headquarters Building Fund. The following non-members of the A. Ph. A. have pledged $25.00 or more to the Headquarters Building Fund and have made a cash payment of $5.00 or more. They are entitled to membership and you are requested to vote on the applications which have been properly endorsed.

H-260, Ruth Damman, 1316 Walnut St., Vancouver, British Columbia; H-261, W. A. Mahoney, 234 Lomax St., Jacksonville, Fla.; H-262, Peter Thomas Rankin, 342 So. Manning Blvd., Albany, N. Y.; H-263, Edward Anthony Stevens, 10 Briggs Court, New Bedford, Mass.

(*Motion 57.*) *Vote on applications of contributors to the Headquarters Building Fund for Membership in the American Pharmaceutical Association.*

E. F. KELLY, *Secretary.*

FRANK SCHACHLEITER MEMORIAL.

A movement has been started for establishing a memorial in honor of the late Frank Schachleiter, who devoted his life to advance pharmacy in Arkansas and aided in the progress throughout the country. The aim is not for large contributions but a representative fund. Those who wish to contribute can send the contribution to Miss Mary A. Fein, Secretary of the Arkansas Association, Little Rock.

EDITORIAL NOTES

Editor: E. G. EBERLE, 10 West Chase St., Baltimore, Md.

Members of the Council, A. PH. A.: S. L. HILTON, *Chairman;* W. C. ANDERSON, *Vice-Chairman;* E. F. KELLY, *Secretary;* JAMES H. BEAL, CHARLES H. LAWALL, HENRY M. WHELPLEY,* H. V. ARNY, A. G. DUMEZ, H. C. CHRISTENSEN, JULIUS A. KOCH, ROBERT P. FISCHELIS. *Ex-Officio:* L. L. WALTON, President; Vice-Presidents, W. C. ANDERSON, CLYDE L. EDDY; E. F. KELLY, Secretary; C. W. HOLTON, Treasurer; WILLIAM D. JONES, Chairman of the House of Delegates. Editors of the JOURNAL and YEAR BOOK: E. G. EBERLE and A. G. DUMEZ. Committee on Publications: A. G. DUMEZ, *Chairman;* R. P. FISCHELIS, H. V. ARNY, H. M. WHELPLEY,* E. F. KELLY, C. W. HOLTON, E. G. EBERLE.

Collaborators: The Members of the Council; the Editor of the YEAR BOOK, A. G. DUMEZ; E. FULLERTON COOK, Chairman, U. S. P. Revision Committee; W. L. SCOVILLE, Chairman, N. F. Revision Committee; the Chairmen of the Sections, A. PH. A.: F. F. BERG, J. G. BEARD, H. C. NEWTON, AMBROSE HUNSBERGER, L. K. DARBAKER; WILLIAM D. JONES, Chairman of the House of Delegates, A. PH. A.; EDWARD H. KRAUS, President, A. A. C. P.; CHARLES B. JORDAN, Chairman Executive Committee, A. A. C. P.; M. N. FORD, President, N. A. B. P.; HENRY C. CHRISTENSEN, Secretary, N. A. B. P.

Note.—This month, on account of more pages in foregoing departments, and the pages in memory of Dr. Whelpley, it was found necessary to hold over considerable matter of this Section for next issue.

OMISSIONS FROM THE INDEX OF NATIONAL FORMULARY V.

Through a mishap, part of the preparations, the names beginning with "P" and "Q," were omitted from the Index of National Formulary V. The names of the powders will be found under the respective English names, but for reference the official names that were omitted follow:

PULVIS ACETANILIDI COMPOSITUS	192
PULVIS ALOES ET CANELL	193
PULVIS ANTIMONIALIS	193
PULVIS ANTISEPTICUS	193
PULVIS AROMATICUS	194
PULVIS AROMATICUS RUBEFACIENS	194
PULVIS CRETÆ AROMATICUS	195
PULVIS CRETÆ ET OPII AROMATICUS	195
PULVIS HYDRARGYRI CHLORIDI MITIS ET JALAPÆ	196
PULVIS MYRICÆ COMPOSITUS	196
PULVIS PANCREATINI COMPOSITUS	196
PULVIS RHEI ET MAGNESIÆ ANISATUS	197
PULVIS TALCI COMPOSITUS	197

And in Part II, the following:

PRUNUM	381
PULSATILLA	381
PUMEX	382
QUERCUS	382
QUILLAJA	383
QUINIDINA	383
RENNINUM	384

The alcoholic strength of **Liquor Ferri Albuminati** should be given as 20% instead of 11%.

* Deceased.

INTERNATIONAL CONGRESS OF PLANT SCIENCES.

Mention has been made in a previous issue of the fourth international botanical congress to be held in Ithaca August 16–23. As has been stated before Dr. Heber W. Youngken is secretary of the Section on Pharmacognosy and Pharmaceutical Botany. Among the distinguished visitors will be Prof. Dr. Carl Mez, who will present a paper on serum inoculations into plants.

BULLETINS OF THE DRUG TRADE BUREAU OF PUBLIC INFORMATION.

Director Robert P. Fischelis has issued Bulletins D-31 and D-32, of the Drug Trade Bureau of Public Information.

D-31 reports the census of pharmaceutical research workers. This is published in this number of the JOURNAL. The number of research workers exceeds that of last year by 58.

Bulletin D-32 relates to General Mercer as physician and apothecary; an account is printed in the June number of the JOURNAL, pp. 423–426. The wide publicity given by newspapers to this Bulletin by the foremost newspapers of the country speaks well for the Bureau and commends it to the participating organizations.

PUBLICITY, INFORMATION, PRODUCTION, DISTRIBUTION AND CONSUMPTION FORM AN ENDLESS CHAIN.

The value of publicity was reflected at the Philadelphia meeting of the Associated Advertising Clubs of the World. The commercial advertiser has discovered that he must do

more than merely describe what he has to sell; he must know something of psychology so as to interest the buyers by his messages. The literary man gets a hearing when his writings appeal to the reader, and the research workers become known through outstanding results and also through their introduction to the public by a publicity expert. The AMERICAN PHARMACEUTICAL ASSOCIATION is known through the great work accomplished by its members, by the achievements for and devotedness to the cause of pharmacy, because of its service and the benefits derived therefrom by the public. The Headquarters' publicity has been a real value to pharmacy and the drug trade in general; the Headquarters, when it is established, will be not only a service institution but will convey a better understanding of pharmacy to the public. It is an outstanding project which will be greater according to the support given to it and the promptness with which the establishment becomes a reality.

PERSONAL AND NEWS ITEMS.

Dr. E. A. Ruddiman, for a number of years chief chemist of John T. Milliken & Co. is now research chemist in the Ford Hospital at Detroit and will do work in biological chemistry. He is succeeded by **Charles W. Lanwermeyer** as chief chemist. Both members are well and favorably known in the AMERICAN PHARMACEUTICAL ASSOCIATION.

T. A. Cheatham, State Drug Inspector for Georgia, graduated in Pharmacy in 1875, and was the first president of Georgia Pharmaceutical Association after it became a chartered body.

E. Fullerton Cook, Chairman of the U. S. P. Revision Committee, attended the meeting of the British Pharmaceutical Society during the first week of this month at Leicester, as delegate of the AMERICAN PHARMACEUTICAL ASSOCIATION.

The JOURNAL has received several cards from **Prof. Otto Raubenheimer,** who, with his family, is touring sections of Europe.

A bronze tablet, celebrating the 50th anniversary of his association with Eli Lilly & Co., was presented to President **J. K. Lilly,** of the latter organization, by employees.

R. R. Ellis, Memphis, Tenn., has contributed a series of "to the point" messages on price standardization and against price demoralization. These have been published in convenient pocket folders by *The Druggist Magazine* of Memphis.

Prof. E. E. Stanford, for a number of years of the faculty of Western Reserve University School of Pharmacy, has accepted the professorship of Botany and Zoölogy, at the College of the Pacific, Stockton, Calif.

Ex-President and Mrs. John G. Godding report a most enjoyable motor trip through New Hampshire and Vermont, stopping at Northfield, Plymouth and Woodstock, and also at Hanover, the home of Dartmouth College, where Dr. Lyman Spalding, the "Father of the U. S. Pharmacopœia," taught chemistry for a time.

President-Elect Theodore J. Bradley and **Prof. Elie H. La Pierre** attended Vermont Pharmaceutical Association meeting. The former spoke on A. PH. A. Headquarters and other subjects of pharmaceutical interest.

Prof. Charles O. Lee, who prior to his work in China was member of the Faculty of Purdue University School of Pharmacy, and more recently located at the University of Wisconsin, has accepted the professorship of Pharmacy at Purdue University.

Dr. K. K. Chen, for some time at the University of Wisconsin, whose study of *Ephedra vulgaris* and the alkaloid *ephedrine* has gained merited recognition for him, will enter Johns Hopkins Medical School as a fourth year student in medicine, and will spend part of the year under Professor Abel.

Dr. Robert P. Fischelis has been elected Secretary of New Jersey Board of Pharmacy. See further reference in Department N. A. B. P.

Secretary H. C. Christensen states that the late **Dr. H. M. Whelpley** was one of the pioneers, if not the pioneer, in the organization of the National Association of Boards of Pharmacy. (See A. PH. A. PROCEEDINGS for 1903, p. 487; also President F. E. Mortenson's address in Proceedings of the National Association of Boards of Pharmacy for 1924.)

Secretary Henry G. Ruenzel, of the Wisconsin Board of Pharmacy, has recovered from a recent illness and has resumed his duties.

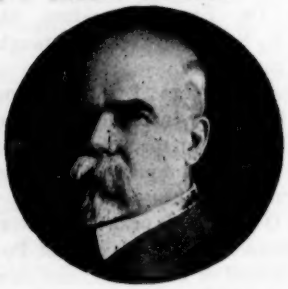
The *Virginia Pharmacist* for July contains a most excellent article by Roy Childrey on "Leaks." There are 26 subjects that are deserving of attention and some of these embody other suggestions.

The *Red Cross Messenger* is promoting "Pharmacy Week" by directing attention to what has been done in the way of making displays and bringing out some new thoughts that may develop pharmacy's message to the people.

IN MEMORY OF HENRY MILTON WHELPLEY.*

President L. L. Walton has paid tribute to the late Henry M. Whelpley, personally and officially, in the sketch of the July JOURNAL and in Council Letter No. 14, printed in this issue, on page 709, and is made part of this memorial.

JAMES H. BEAL, EX-PRESIDENT, A. PH. A.[1]



HENRY M. WHELPLEY.

If I can speak of our departed friend, Henry Milton Whelpley, only in terms of eulogy, it is because from my recollection of his life and character I can summon to mind nothing that was not truly admirable, nothing that would not be truly becoming to the character and behavior of the perfect gentleman.

From the memory of a very close and intimate association with him for nearly one-third of a century, frequently under circumstances calculated to bring to light traits of character that ordinarily lie beneath the surface, I can recall no act of his that would not bear close scrutiny, no single word of his that I would erase or change, no memory of him that I would willingly lose. He was a man of clean heart, of clean thought, and clean in speech and action.

One of the outstanding features of his character that occur to me on this occasion was his fine and large tolerance for the opinions and prejudices of other people. No sincerely held opinion of another was ever treated contemptuously by him, even though he could not subscribe to such opinion himself. He did not willingly think evil of others or attribute unworthy motives to those who disagreed with him on matters of policy.

While largely tolerant of the views of other men it was not because he was himself a neutral character, or indifferent to principles which he believed to be important. His own convictions, derived through the careful weighing of evidence and the balancing of arguments, he held strongly, but never so strongly as to close his mind to the impartial consideration of arguments which others might conceive to be of importance.

While it is perhaps too much to expect that any human shall be entirely free from the bias of self-interest or from prejudices growing out of environment, I at least do not recall any instance where his own personal interests or preconceived opinion operated to prevent him from giving fair and impartial hearing to conflicting views and interests.

Dr. Whelpley was practical-minded in the sense that he did not permit himself to become too enthusiastic in behalf of the sudden reform of men and institutions which so many well-meaning people advocate and seem to believe possible. He always kept his feet on the solid ground of experience and common sense. In the reforming of men and human institutions he believed in evolution rather than revolution, that human progress is a continuous process and does not take place by leaps and bounds; that the old things of to-day must be linked with the new things of to-morrow by a bridge of compromise, so that the old may merge into the new without sensible break of continuity.

Dr. Whelpley's life is better described in verbs than in adjectives. He was a man of action, who was constantly doing things of positive and constructive character. With him no office was a sinecure. Others might accept official dignity to wear as an ornament, but unless Dr. Whelpley could perceive the opportunity for useful and constructive effort he did not accept the office.

Dr. Whelpley's commanding position in the world of pharmacy and in the various societies with which he was associated was not due to accident but to solid and meritorious service. He never spared himself in any work with which he was connected. In the development of the St. Louis College of Pharmacy, in the building up of the financial system of the AMERICAN PHARMACEUTICAL ASSOCIATION and as Secretary of the Board of Trustees of the United States Pharmacopœial Convention, he has left an impression upon the structure of each that will never be effaced, and rendered services that will always be gratefully remembered by his colleagues in these various enterprises.

From whatever angle we may consider Dr.

* For sketch see July JOURNAL, p. 523.

[1] Remarks at funeral services for Dr. H. M. Whelpley.

Whelpley's busy and fruitful life, we shall discover features worthy of admiration and emulation. Wise and even-tempered, just and charitable, directed by the kindly light of a naturally generous disposition, he did good and not evil all the days of his life. In all the attributes that go to make up the character of the high-minded gentleman, the earnest and useful citizen, the loyal and generous friend, I have never known and never expect to know his superior.

H. C. CHRISTENSEN, SECRETARY OF NATIONAL ASSOCIATION OF BOARDS OF PHARMACY.

When one surveys the history of any profession for a quarter century or more, he becomes aware of certain outstanding men whose names are inseparable from that profession; men whose force, character, and foresight are tremendous factors in the moulding of that profession; men whose names are synonymous with all that is worthy and best in that profession; men whose labor in their chosen field makes all men their debtors. Such a man was Henry Milton Whelpley in the profession of pharmacy, whose death on June 26, 1926 takes from us a man whose loss will be long and keenly felt. Pharmacist, teacher, editor, philosopher, friend and worker in our profession—his absence from the ranks of the leaders is a serious blow to pharmacy.

A recount of the labors of Dr. Whelpley would summarize the development and progress of pharmacy since the early '90's. Had our profession its Hall of Fame, his place would be as assured as the sun in the heavens. He will live enshrined in the memory of all who knew him, and his contributions to our profession give him a permanent place in the annals of science. As a friend and citizen, Dr. Whelpley exemplified the highest type of American manhood. Of genuine American lineage, his poise, judgment, stability and kindly counsel made him invaluable in gatherings of his fellow-men. His conciliatory attitude, however, did not deter him from battling for a principle when right and justice were at stake. He was of the great Middle West; in his passing, the Mississippi Valley has lost a most valuable citizen. Pharmacy has lost an able leader. Hundreds of us have lost a most valued *friend*. The place he held in our profession will not be easy to fill. Our appreciation of him can be t be expressed by laboring for the principles he personified, by struggling for the ideals he held, by aspiring to place pharmacy on the high plane for which he worked unceasingly, and by according him in the history of our profession the place his labors, his idealism, and his leadership so richly deserve.

HARVEY W. WILEY, M.D., FORMER CHAIRMAN OF U. S. PHARMACOPŒIAL CONVENTION.

I had not seen an account of Dr. Whelpley's death until I read the notice of his funeral. To me it was a great personal shock. It was my good fortune to know Dr. Whelpley intimately from 1910 to 1920 in connection with the Ninth Revision of the American Pharmacopœia. It was my good fortune at one of the meetings of the Trustees in St. Louis to see the wonderful archæologist in his museum. Dr. Whelpley was not only a pharmacist, but also a scientist of wide learning and influence. His fame as an archaeologist equalled, if not exceeded, his fame as a pharmacist.

After ten years of intimate personal association I met him last spring at a meeting of the Trustees in Washington, where I had the great pleasure of lunching with my old associate. I can say no words of praise adequate to my desires. Henry Milton Whelpley was a scientist, a citizen, and above all, a man. May he rest in peace.

E. F. KELLY, SECRETARY OF AMERICAN PHARMACEUTICAL ASSOCIATION.

American pharmacy has lost one of its most efficient workers and staunchest friends in the death of Dr. Whelpley and his genial personality will be missed, especially at the A. PH. A. meetings. As his successor as Treasurer of the A. PH. A., I was privileged to know Dr. Whelpley very well and am indebted to him for much good advice. I was impressed by his kindliness, his even temper, his capacity for detail, his scrupulous exactness, his optimism, and his sound common sense, and by the very delightful comradeship which existed between Mrs. Whelpley and him.

THEODORE J. BRADLEY, PRESIDENT-ELECT, A. PH. A.

It would be difficult to say anything that has not been said in the many tributes that have been paid to Dr. Whelpley, but I can add a word expressing my sense of loss at his passing. For upwards of twenty years it was my pleasure and profit to be associated with him in various activities and it has been pleasant for me to feel that my warm regard for him

was reciprocated. His wise and friendly counsel was freely given when asked for and it was always safe for us younger men to follow it. Those who have been associated with him in any way will continue to miss his genial presence, and his record will keep his name in the Pharmaceutical Hall of Fame, among those who have rendered conspicuous service to the calling in America.

CHARLES E. CASPARI, ACTING DEAN ST. LOUIS COLLEGE OF PHARMACY.

To say that Dr. Whelpley will be missed is a most trite and commonplace statement. Only those who have been closely associated with him for a number of years are in a position to realize the tremendous amount of work that he did and his versatility in covering a large number of subjects.

We, at the St. Louis College of Pharmacy, mourn his loss as dean and professor of Pharmacognosy and feel that it will be most difficult to replace him adequately. His conscientious attention to duty, together with his tact in handling any situation that might arise, have won for him our deep appreciation, and, while we realize that death must come to each of us, sooner or later, we profoundly regret that Dr. Whelpley was not spared to us for more years of useful activity.

H. H. RUSBY, EX-PRESIDENT, A. PH. A.

My personal acquaintance with Dr. Whelpley dates from my first connection with the American Pharmaceutical Association and it is in that connection that I shall always remember him best. One of my earliest recollections of the Association is that of seeing him in active movement among the members and it is in this way that I have usually seen him ever since. In my experience, he has represented a large part of the A. PH. A. Looking over the records of important work performed by the Association during the past generation, one finds very little in which Dr. Whelpley has not been associated. Although his activity in its business affairs was so great, it is probable that the social side of its work has benefitted still more through his attendance, the regularity of which has been quite phenomenal. My fellow members, like myself, will miss him in a peculiar way in future.

One of the most interesting things about Dr. Whelpley's life has been the breadth of his interests, outside of pharmacy. Early in life, he was wise enough to add the interests of an avocation to those of his vocation, and he took for his hobby the study of American antiquities. Although not a great author on this subject, his knowledge was extensive, definite and accurate, and it was a great delight to converse with him on these topics.

In his educational work, Dr. Whelpley, while distinctly conservative, ever has been ready to meet proposals for wise and sound progressive action.

CASWELL A. MAYO, EX-PRESIDENT, A. PH. A.

Henry Milton Whelpley filled a unique place in American Pharmacy. His was above all the human touch. To a remarkable degree he had a capacity for smoothing out differences and insuring coöperation. He realized that apparent differences between earnest workers for the cause of pharmacy were often difference on immaterial points and was most successful in smoothing out such differences, thus being able frequently to accomplish much for the cause of pharmacy by bringing together men who were apparently in antagonism. His method of presenting his views on most questions was an unusual and most happy one which frequently won others to adopt his own views. This worked well for pharmacy for his views were sound and unselfish. He was ever an indefatigable worker for the advancement of pharmacy and his death will leave a great void in the ranks of the older workers for the cause. Personally I shall mourn his loss as that of one of my best and oldest friends.

S. L. HILTON, EX-PRESIDENT A. PH. A., AND TREASURER BOARD OF TRUSTEES, U. S. P.

Dr. Whelpley and I have been associated for more than thirty years in the AMERICAN PHARMACEUTICAL ASSOCIATION and for nearly twenty years in the U. S. P. Convention; the notice of his sudden death came to me as a great shock and surprise, because I saw him in May when he seemed to be in excellent health and that he had many more years of usefulness before him.

I attended his funeral and was called upon to pay a tribute to his memory.—Dr. Whelpley was a true Christian, he lived a life that was truer and better than that of the most of us, he was always prepared for the end at the call of Divine Providence. His broad view of all matters pharmaceutical was always a revelation to me; he might differ in his opinions, but he never attempted to press them unnecessarily and was always willing to compromise in order to secure what was for the best. He

held that others had a right to their views and he was willing to meet and counsel and advise with them. His life may well be followed, because it was as nearly perfect as humanly possible. Pharmacy and the allied professions have sustained a great loss; he has, I am certain, received his just reward for the exemplary life he lived, and has gone to prepare the way for his devoted helpmeet, his beloved wife.

Whelpley, the pharmacist, the editor, the educator, the counselor and adviser, the true man and friend, will be more missed in the future than we can realize at this time; may the Good Lord bless him and, if it is possible, direct him to advise us so that we can emulate his example and perform our work as we should for our fellow-man.

H. V. ARNY, EX-PRESIDENT OF THE A. PH. A.

It is difficult for those of us who have followed the A. PH. A. conventions of the past 30-odd years to imagine an annual meeting without the presence of our dear friend Whelpley, with his kindly smile and his badge with its strings of bars showing attendance at every A. Ph. A. meeting for almost 40 years. His calm good humor, his apparently perfect health, his self-evident vitality gave his friends little thought that he would be taken from us for many years to come. In this way, the sad news of his passing came to all of us as a keen shock and after sharpness of the shock passed, there came to his friends the great regret that he who had done so much for American Pharmacy had passed from his labors.

The three words that best epitomize the virtues of Dr. Whelpley are industry, devotion and kindliness. No man could accomplish what he did for American Pharmacy without possessing the gift of enormous industry. As to devotion, no man (except possibly his great mentor, Albert E. Ebert) ever gave fuller devotion to the AMERICAN PHARMACEUTICAL ASSOCIATION than did Dr. Whelpley. As to kindliness few men followed more fully the adage, "a soft answer turneth away wrath." In fact it might be said that the secret of his remarkable skill as a parliamentarian was due largely to his unruffled demeanor, even in the midst of great provocation, and to his gentle kindliness in debate, when he frequently completely disarmed his pugnacious opponent by the exercise of his inherent courtesy.

In closing, it must be said that the admirable qualities of Dr. Whelpley were delicately accentuated by the inestimable assistance rendered him by Mrs. Whelpley. We, his older friends in the A. Ph. A., acquired the habit of never thinking of him without thinking also of his wife. "Laura and Henry" seem to us an essential part of the A. PH. A. "Laura and Henry" will live in our hearts so long as our hearts function. To dear Mrs. Whelpley our affectionate sympathy goes forth with the earnest wish that this sympathy may in some slight degree assuage her grief.

GEORGE M. BERINGER, EX-PRESIDENT OF THE A. PH. A.

It will indeed be difficult for the members of the AMERICAN PHARMACEUTICAL ASSOCIATION to realize that the most faithful attendant of its conventions, our beloved fellow member, Dr. Henry M. Whelpley, will meet with them no more. The sudden call that summoned his soul to "cross the bar" deprived us of the counsel and the companionship of this lovable man and devoted fellow member. It has left us painfully grieved at the personal loss of this esteemed friend and distressed by the severity of the blow that pharmacy has sustained by his demise.

Henry M. Whelpley gave freely of his time and energy to pharmacy and was an indefatigable worker in its behalf. His services and devotion to this vocation and to the advancement of its professional ideals won for him the universal regard and esteem of pharmacists and recognition as an exemplary leader.

He was an outstanding figure in American pharmacy and it has been given to but very few men to have had the influence in pharmaceutical circles that was wielded by Dr. Whelpley. His devotion to principles and his long, faithful and unselfish services in the various offices and duties imposed upon him, combined with his genial personality, his alert mentality, his logical consideration, his experienced judgment, made his counsel and advice valuable—consequently, his opinions and commanding influence in determining many of the problems and policies of pharmacy. He presented his personal views in a plausible manner that gained consideration and not infrequently convinced his hearers. His executive ability often enabled him to secure the needed action.

Dr. Whelpley was a student and a deep thinker and applied himself whole heartedly and methodically to every task that he was associated with. In pharmacy, in the medical sciences, in archæology and in American In-

dian lore, in which studies he specialized, he gained distinction as an authority.

My close personal association with Henry M. Whelpley dates from 1901 when he was elected president of the AMERICAN PHARMACEUTICAL ASSOCIATION. The following year, the 50th anniversary of the founding of the ASSOCIATION, was celebrated by the Golden Jubilee Meeting in Philadelphia at which he presided. As President, he drew me out of my retirement as a non-active member, drafted me into the service and showed me a duty awaiting. I am indebted to him for this initiation and an active acquaintance with the work of this ASSOCIATION that has been fruitful in labors and friendships with many kindred spirits.

In our correspondence and in the intercourse at conventions, conferences and committee meetings during all of the succeeding years, I have never known him to utter an unkind word or to comment upon or criticise harshly any fellow member.

It is appropriate that we pay our tribute to this man of irreproachable character, to this faithful friend possessed of such sterling qualities, to this devoted worker and fellow member. It is fitting that his associates record their personal impressions of such a useful career, such a life dedicated to unselfish services to his fellow men. Personally, I lay my wreath of tribute at his tomb and attest my lasting regard and esteem. The impressions made by his exemplary life and devoted services are indelibly pictured in my memory and prized beyond estimate are the remembrances of the friendship terminated by death.

FREDERICK J. WULLING, EX-PRESIDENT, A. PH. A.

Affability was one of the outstanding qualities of Dr. Whelpley. He was always friendly and cordial and for most of the time a smile lighted his countenance—at least this was his reaction upon me during the nearly forty years we were friends. When sometimes his arguments would not convince his smile would persuade. Others will speak of his achievements, of his industry and perseverance and of his interest in science, but I want to emphasize his congeniality and friendliness and goodwill to all—qualities that spring from the heart and appeal to the heart and which through their exercise bring more happiness into the world than is generally realized. Others will say the Doctor contributed to pharmacy, medicine, archæology, science in general. I say he also contributed to the happiness of the world in a much larger measure.

WILLIAM B. DAY, FORMER SECRETARY AND PRESIDENT OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

To those who were closely associated with Dr. Whelpley it was a source of constant wonder that he was able to undertake work in so many fields and to discharge these manifold duties not only capably, but often brilliantly. His studies of the archæology of the American Indian were his diversion, but he was recognized as an authority in this field. Administrative and teaching duties occupied much of his time and strength; his editorial labors were not inconsiderable; but his interest centered greatly in pharmaceutical organization and particularly in the AMERICAN PHARMACEUTICAL ASSOCIATION, to which he gave without stint of his time and thought. His record of thirty-nine years' membership during which he never missed an annual meeting has probably never been equalled in the A. PH. A. His services as Secretary of the Council, President and Treasurer were invaluable.

In the organization's activities Dr. Whelpley was a conservative in the right sense of the word. His efforts looked toward conserving the good already achieved so as to make of it a foundation for future progress. He was in the fullest sense a loyal friend and an honest man. He will be greatly missed.

JOHN G. GODDING, EX-PRESIDENT, A. PH. A.

It has been my rare privilege to enjoy Dr. Whelpley's friendship for more than thirty years, in the AMERICAN PHARMACEUTICAL ASSOCIATION. His fine qualities were known to its membership and in all activities of pharmacy throughout the country. His very interests in medicine, pharmacy, and archæology will ever stand as a monument to an honored career. His wise counsel will be missed in the organizations wherein he was known and beloved.

As a comrade in travel he was jovial, interesting and companionable.

His death comes as a keen personal loss to Mrs. Godding and myself.

E. G. EBERLE, EX-PRESIDENT OF THE A. PH. A.

It is always difficult rightly to express the merits or traits of character which endeared friends and co-workers to us. My acquaintance with Dr. H. M. Whelpley for considerably more than a quarter of a century impresses me with these among other outstanding qualities—he made use of his extensive and

varied reading and study for himself and others; he had a keen intellect, was a wise and conservative thinker, a logical and discriminating writer; he was genial, considerate, cheerful and companionable.

The AMERICAN PHARMACEUTICAL ASSOCIATION holds his among many distinguished names in immortal honor and in unforgetable reverence. Their records are part of its history; from the walls or niches of the Hall of Fame there will be speaking-likenesses of them for those who follow and those who associated with them. The Association is complex: it is great because its service reaches every one of the divisions of Pharmacy; Henry Milton Whelpley will be remembered because he was identified with so many activities and zealous and devoted in everything he undertook; he spoke ill of no man and encouraged those who sought his counsel.

FREDERICK B. KILMER, NEW BRUNSWICK, N. J.

Whelpley has gone but the waves of his tireless energy still move and will move through the years to come. Whelpley had the rare gift of injecting spirit, enthusiasm and life into groups, organizations and into individuals. He was ever in the vanguard of advancing and chang ng science. His last correspondence with me was filed with a discussion of the forward steps in pharmaceutical education. Like other great men, he had the power of making others forget their own inferiority and take a place beside him among the great leaders and workers. As the men like Procter, Rice, Remington and Whelpley pass on, let us look for new masters who will come forth to meet the newer and higher needs.

ROBERT P. FISCHELIS, MEMBER OF THE COUNCIL A. PH. A.

News of the untimely death of Dr. Whelpley was a great shock to all of us here. No one who had the opportunity of associating with Dr. Whelpley at the conventions of the AMERICAN PHARMACEUTICAL ASSOCIATION could fail to appreciate his great ability to crystallize the sentiment of a meeting into a few well chosen words which frequently became the basis of the final action on many a controversial subject.

Dr. Whelpley's interest in the younger men in pharmacy was another of his outstanding characteristics. He was always ready with a note of commendation or offer of assistance to those who were charged with carrying on the work of various committees in the ASSOCIATION. This desire and ability to encourage the workers in pharmacy to constantly do their best in the tasks allotted to them has undoubtedly been of great help to various associations and naturally endeared Dr. Whelpley to a large circle of their members.

WILHELM BODEMANN, CHICAGO VETERAN DRUGGISTS' ASSOCIATION.

The telegram from my friend Carl Meyer, informing me of Dr. Whelpley's death, came like a thunderbolt out of a blue sky—and it took quite a while before I would believe it, because H. M. W. was a very close friend for the last forty-five years. He was very careful in words, following the Roman adage—*Favere linguis*. He was not as careful in his loyalty to friends—stuck to them when they were not worthy of his friendship.

He had no peer in his wonderful gift of system. By his card index he could give you the pictures and all statistics of men connected with Pharmacy.

Almost the last thing he planned for *Meyer Druggist* was a most beautiful tribute to my 80th mile-stone. Sam Henry sent me that page of Meyer Druggist on June 25th. I dropped Henry M. a card at once—thanked him for same and scolded him for overdoing his estimation of my career. That card reached his office the very morning he closed his eyes!

I shall not attempt to enumerate his achievements as a teacher, as editor, as U. S. P. Trustee and officer, as archæologist and A. PH. A. official—that can and will be done by his associates in those activities. To me he was a dear friend and I loved him as an enthusiastic member of the C. V. D. A.

H. D. FAXON, KANSAS CITY, MO.

As a sincere admirer of Dr. Whelpley, I do want to add my word in response to your invitation. I had an intimate talk with him after the banquet in Kansas City, June 17th, and left immediately for a trip to the mountains. On my return, in July, I was shocked to find that his cheerful spirit had departed from us.

I admired him because he was a scientist, persistent and indefatigable. Because he was serene. Because he had that necessary quality, somewhat rare in men of science, a sense of humor. Because he had a sense of the dignity of life. Because he had hobbies. I never knew a man who hunted arrowheads

who was not worth knowing. The principal reason for my admiration lies in the fact that he was not a self-seeker, but one of those rare souls, who without affectation, undertakes with manly faith the duties which science imposes on the individual for the good of humanity, duties that generally lead to but slight material rewards. I hope civilization is developing more men like him.

L. G. BLAKESLEE, ST. LOUIS, MO.

I acknowledge receipt of your letter of June 28th and I certainly share your sorrow and distress regarding the untimely death of our mutual friend, Dr. Whelpley.

The annual meetings of the A. PH. A. will not seem natural without Dr. Whelpley and society in general has sustained a severe loss by his death.

C. V. D. A. MEMORIAL.

The Chicago Veteran Druggists' Association held a brief memorial service for the late Dr. H. M. Whelpley at the noon-day luncheon July 8th.

RESOLUTION ADOPTED BY THE ILLINOIS PHARMACEUTICAL ASSOCIATION AT ITS FORTY-SEVENTH ANNUAL CONVENTION HELD IN CHICAGO, JUNE 29, 30 AND JULY 1, 1926.

WHEREAS: The pharmaceutical world has been called upon to witness the passing of one of its most valued and honored leaders, Dr. Henry M. Whelpley of St. Louis;

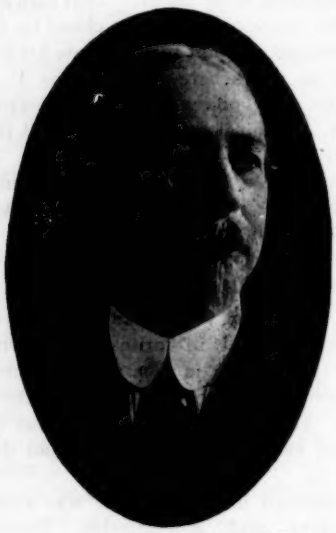
THEREFORE, the Illinois Pharmaceutical Association in convention assembled takes this opportunity to express its deep sense of loss and its appreciation of the untiring service of Dr. Whelpley during his whole life, service so generously rendered and so productive of great good to the cause of pharmacy.

The memory of Dr. Whelpley and our enduring affection for him will ever remain in our minds and hearts.

OBITUARY.

WILLIAM HUBBELL GANO.

William H. Gano, member of the AMERICAN PHARMACEUTICAL ASSOCIATION since 1892,



Courtesy Phila. College of Pharmacy and Science
W. H. GANO.

died July 21, at his home in Philadelphia after an illness of ten weeks.

Mr. Gano was a lineal descendant of John Bartram, the first American botanist, and of the Rev. John Gano, who served as chaplain in Washington's army. He was born in Wilmington, Del., in 1862, the son of Charles H. Gano and Anna E. Bartram Gano. He was graduated from the Philadelphia College of Pharmacy and Science in 1884. After graduation, he clerked, successively, with George I. McKelway, Joseph P. Remington and George B. Evans, of Philadelphia. He engaged in business on his own account in 1892 at 17th and Columbia Avenue, Philadelphia, and conducted a most successful pharmacy until he retired in 1914, after which he became a director of the Girard Avenue Title and Trust Company.

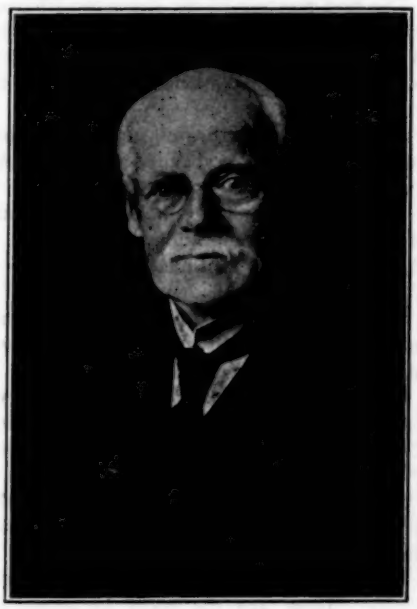
Mr. Gano was a member of the Pennsylvania Pharmaceutical Association and active in the Alumni Association of his Alma Mater, of which he was treasurer for a number of years until his demise. Resolutions of respect, paying tribute to a worthy son were adopted by the Executive Committee.

The deceased is survived by his widow, Mrs. Lydia E. Gano, and a sister, Mrs. Emil Larsson, of Plainfield, N. J. The funeral services were under the direction of the Rev. Dr. Robert Littell, of the Tioga Presbyterian Church.

We are indebted to Secretary J. W. England, of the Alumni Association, for the data of this sketch. Personally, the writer desires to express high regard for the deceased who was a classmate and always a friend, in every sense that the term implies.

CHARLES CALVIN BINGHAM.

Charles C. Bingham died April 25, 1925, in the home where he spent nearly all of his life. He was born in St. Johnsbury, July 4, 1846. In 1919 Mr. and Mrs. Bingham celebrated their golden wedding.



CHARLES C. BINGHAM.

After the death of his father, J. C. Bingham, in 1870, Mr. Bingham succeeded to the drug store which his father bought in 1845.

Throughout the Civil War and for several years later the telegraph office was in the Bingham Drugstore and Mr. Bingham became an expert telegrapher handling most of the messages through the exciting days of '61 to '65, as Gov. Erastus Fairbanks had his official residence in St. Johnsbury, necessitating much extra business between this city, the state, and national capitals.

Mr. Bingham kept up his interest in electrical development and in the late seventies installed the first telephone in this section between his house and store. This was soon extended to include physicians' offices and later he established the St. Johnsbury Exchange which he managed for some years.

Mr. Bingham was one of the few druggists in the state to belong to the AMERICAN PHARMACEUTICAL ASSOCIATION of which he had been a member for 50 years. He was a member of State Association from its organization and was a member of the first Board of Pharmacy and served as its President for some time.

He was senior deacon of the North Congregational Church and, with one exception, the oldest member.

He retired from business in 1919 but kept up an interest in everything that pertained to the good of the community to the very last. A lover of flowers and the great out-of-doors, he kept his grounds neat and trim.

His store was one of the oldest and best known in Vermont. He was the last of St. Johnsbury's older business men. He represented another generation, a gentleman of the old school, the highest type of citizen. The local druggists attended his funeral in a body.—WELCOME B. EASTMAN.

NOTE: Effort was made to secure a sketch ever since the demise of Mr. Bingham, because of his 50-year membership, but Mr. Eastman was not in position to supply the data until recently.

SOCIETIES AND COLLEGES.

A TYPOGRAPHICAL ERROR IN SESQUI FOLDERS RELATIVE TO MEETING DATES OF THE A. PH. A.

Page 34, lines 16 and 17, of the Sesqui Folder sent out by the Local Philadelphia A. PH .A. Committee should be September and *not* August—the meetings of the AMERICAN PHARMACEUTICAL ASSOCIATION, of the American Association of Colleges of Pharmacy and National Association of Boards of Pharmacy will be held during the week of September 13. Local Secretary Ambrose Hunsberger has asked us to call attention to this typographical error.

"PHARMACEUTICAL FIRSTS" IN PHILADELPHIA.

BY CHARLES H. LAWALL.

The visitor to Philadelphia who is interested in matters historical will find much that is

distinctive and unusual in connection with the development of Pharmacy.

Philadelphia long has been known as the "City of Firsts" in historical matters. It is not generally known outside of the pharmaceutical profession that it is a "City of Firsts" in matters of interest to the pharmaceutical and medical professions.

The oldest commercial firm in the United States is the firm of T. Morris Perot, who in 1687 opened a Malting establishment and for more than two centuries have furnished malt and malt products to their customers.

The first hospital pharmacy was established in 1754 in connection with the Pennsylvania Hospital, still occupying the block at 8th and Spruce Streets. Jonathan Roberts was the first hospital pharmacist to take charge of this work.

The first medical College in America was the Medical School of the College of Philadelphia founded in 1765 by Dr. John Morgan and later merged in the Medical Department of the University of Pennsylvania. Dr. John Morgan was the first physician to write a prescription to be filled by a pharmacist.

The first official Pharmacopœia in America was the one completed at Lititz and published in Philadelphia in 1778 for use in the United States Army.

The first chemical manufacturing on a large scale was done by Christopher and Charles Marshall in 1786 in connection with their retail drug business.

The first white lead factory in America was established in 1804 by the Wetherills.

The first Dispensatory to be published in the United States was Coxe's American Dispensatory issued in 1807, later this was superseded by the "United States Dispensatory" issued by Wood and Bache about twenty-five years later.

The first drug milling establishment was that of Hagners which in 1812 ground drugs and chemicals for the pharmaceutical profession.

The first College of Pharmacy in the new world was established in 1821 as the Philadelphia College of Apothecaries, later changed to the Philadelphia College of Pharmacy, now functioning as the Philadelphia College of Pharmacy and Science.

The first soda water was bottled in Philadelphia by Smith and Hodgson prior to 1825.

The first Pharmaceutical Journal in America was the *American Journal of Pharmacy* which was begun in 1825 and which just celebrated its First Centenary last year.

The first chair in any College of Pharmacy to be devoted exclusively to the teaching of Pharmacy was established in 1847 and Professor William Procter, Jr., the "father of American Pharmacy," was its first incumbent.

The first glycerin to be commercially made on the manufacturing scale was made by Robert Shoemaker in 1848 in his laboratory at 4th and Race Streets.

The first Pharmaceutical Code of Ethics of any importance was that adopted by the Philadelphia College of Pharmacy in 1848.

The first meeting of the American Pharmaceutical Association was held in Philadelphia in 1852, the greatest and most representative organization of Professional Pharmacy in the world.

The first manufacture of sugar-coated pills on a large scale was begun in Philadelphia by William R. Warner in 1857.

The first attempt to make the palatable pharmaceutical preparations now known as elixirs was made in Philadelphia by A. B. Taylor in 1859.

The first compressed tablets to be successfully manufactured and put upon the market were made by Jacob Duncan in 1869.

The first woman graduate in America was Dr. Clara Marshall in 1876. She later became Dean of the Woman's Medical College of Pennsylvania.

The first antitoxin laboratory was established in the 90's in Philadelphia by H. K. Mulford and Company.

There are many other "Pharmaceutical Firsts;" these are the most important and interesting.

SOME PHILADELPHIA HOTELS AND THEIR RATES.

Members may write to the Hotels or address the Chairman on Hotels, B. C. Goodhart, 11th & Locust Sts., Philadelphia, for rates and reservations. The letter "H" before Bellevue-Stratford signifies that it is the Headquarters Hotel, the numbers before names of other hotels indicates the number of blocks from the Headquarters; the first rate figures indicate rate of single room with bath; the second figures are for double room with bath. Where no rate has been given "inq." signifies "inquire."

H. Bellevue-Stratford, $5 to $8; $8 to $14.
2. Adelphia, $4 to $5; $6 to $10.
1. Walton, inq.; $10.

6. B. Franklin, inq.; $7 to $10.
3. Vendig, $4 to $5; $6 to $8.
7. Green's, $3.50 to $4; $5.50 to $6.
20. Pennsylvania; $3.50 to $6; $5 to $7.
1. Spruce, $5; $10.
4. Robert Morris, $4; $8.
2. Sylvania, $4; $6.

Names and addresses of other hotels are: The Elks, Broad & Vine; Hanover, 12th & Arch; Guy's, 7th & Chestnut; Lafayette, 1339 Arch; Lorraine, Broad & Fairmount; Majestic, Broad & Girard; Rittenhouse, 22nd & Chestnut; Ritz Carlton, Broad & Walnut.

Avoid trouble and inconvenience by making your reservations in advance and have with you an acknowledgment from the hotel or from Mr. Goodhart.

THE ENTERTAINMENTS.

The Local Committee has arranged for a program of entertainment that will give everyone an opportunity to see the historic points of Philadelphia. The program for the ladies is continuous and includes, besides lunches, teas, sight-seeing, cards, shopping tours, etc., trips to historical places, of which Philadelphia has many. See July JOURNAL under Association Business.

PROGRAMS OF THE MEETINGS.

The programs of the meeting will be found under "Association Business" of the July Issue, p. 592; the Departments of the American Association of Colleges of Pharmacy, National Association of Boards of Pharmacy, and this Division of the present and of the July number. It is hoped to have a completed program in the September issue, and an effort will be made to have this reach a large percentage of the membership prior to the convention dates. The official program will be distributed at the meeting. Make your arrangements to come, see the passenger agent as to rates for the Sesqui during the A. PH. A. meeting, and make your hotel reservations before you come.

HOUSE OF DELEGATES.

Delegates from State Associations and other represented organizations in the House of Delegates are invited to present resolutions, reports and other subjects which their respective organizations wish to have discussed and considered by the House of Delegates. Resolutions should be submitted in writing. Resolutions can be presented at any session which permits consideration by the Committee on Resolutions.

Reports of Committees on Patents and Trade Marks, on Status of Pharmacists in Government Service, on Local Branches, on Memberships, on State and National Legislation, on U. S. P., on Recipe Book, on Horticultural Nomenclature, on Physiological Testing, on Weights and Measures, on William Procter, Jr. Memorial, on International Pharmaceutical Nomenclature, on Standards of Drugs and Chemical Products, on Coöperative Publicity, on Pre-requisite Legislation, on Biological Products, and on Pharmacy Week, are submitted to the House of Delegates.

The Committee on Nominations and that on Resolutions are appointed at the first session; the former reports on the second day, the final report of the latter is made on the last day of the convention.

PARTIAL PROGRAMS OF THE SECTIONS.*

Scientific.

Chemistry.

"The Effect of Benzoic and Cinnamic Acids on the Rate of Development of Rancidity in Lard," Wm. J. Husa and Lydia M. Husa.

"A New Type of Preparations of Vegetable Drugs," Thomas S. Githens.

"The Effect of Time upon Fowler's Solution," D. M. Copley.

"The Glucosides of Caulopyllum Thalictroides," Edward D. Davy and H. P. Chu, M.D.

"The Need of Greater Activity in the Making of Analyses of Medicinal Preparations found on the Open Market and of a Wider Publicity of the Analyses," Frederick J. Wulling.

"Some Applications of Colloidal Chemistry to Pharmacy," C. B. Jordan.

"The Colorimetric Assay of Digitalis," L. W. Rowe.

"The Colorimetric Assay of Strophanthus," L. W. Rowe.

"National Research Laboratories for the A. PH. A.," Edward Swallow.

"The Volatile Oils from the Cultivated and Wild Varieties of Mentha Citra," E. V. Kyser and H. R. Totten.

"Hydrogenated Cocoanut Oil and Cocoanut Oil Butter as a Substitute for Lard in Iodine Ointment," E. V. Kyser and J. A. Bullock.

"The Effect of Gelatin on Titration Curves of Various Acids," Ernest Little.

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*For report on Program see also July JOURNAL, p. 601.

"The Analysis of Camphorated Oil," Charles F. Poe.

"Caulophyllum Thalictroides," Edward F. Davy and H. P. Chu.

"Assay of Atropine Sulphate Tablets and Granulation," W. P. Edwards and R. E. Schoetzow.

"Effect of Acidity on the Activity of Pepsin in the Solid State," W. E. Honsinger, A. L. Dinger and R. E. Schoetzow.

"U. S. P. X Nitrate Test on Solution Ferric Chloride," M. W. Cary and R. E. Schoetzow.

Botany and Pharmacognosy

"The Living Belladonna Plant," F. B. Kilmer.

"Variation in the Constituents of Grindelia Grown in Various Sections of the U. S.," C. J. Zufall.

Pharmacology and Biological Assays.

"Additional Studies on Miré," Thomas S. Githens.

"The Influence of Digitalis on the Resistance of Guinea Pigs to Poisoning with Diphtheria Toxin," Charles C. Haskell.

"Further Studies of the Anæsthetic Properties of Propylene," Lloyd K. Riggs.

"Permanganate as a Cure for Impetigo," Edward H. Carus.

"Respiration Test as a Possible Substitute for the Usual Basal Rate Determinations," Albert Schneider.

"Dermographia: Dermographic Tests and Observation," Albert Schneider.

"Some Observations of Digitalis Action," Albert Schneider.

"The Earthworm Method for Testing Santonin and Related Anthelmintics," Albert Schneider.

"A Phyto-Pharmacological Method of Assaying Digitalis." Illustrated by Lantern. David I. Macht and John C. Krantz, Jr.

"Influence of Various Radiations of the Potency of Digitalis," David I. Macht and John C. Krantz, Jr.

"Nutritional Value and Standardization of Cod Liver Oil and its Non-Saponifiable Fat Soluble Vitamine Concentrate," H. E. Dubin.

Bacteriology and Biology.

"The Simplification of Rabies Vaccine," J. C. Peacock.

Practical Pharmacy and Dispensing.

PARTIAL PROGRAM.

"Location of Prescription Department," Chas. H. Stocking, Ann Arbor, Michigan.

"A Prescription Clinic," Adley B. Nichols.

"A Study of the Stability of Physostigmine Solutions," John C. Krantz, Jr., and Frank Slama, Baltimore, Md.

Education and Legislation.

(Changes and Additions; see program p. 603, July JOURNAL.)

"In 1825," Otto Raubenheimer.

"Shall the Mass Production of Pharmacists be Continued," Robert P. Fischelis.

"Higher Standards Justified," Frederick J. Wulling.

Prof. A. R. Bliss states that time will not permit completion of paper on, "Pharmacy Taught the Medical Student," and he asks that this subject be deleted.

As far as possible, the complete program will appear in next issue of the JOURNAL.

Commercial Interests.

"A Procedure in Prescription Pricing," Leonard A. Seltzer.

"Is the Pendulum Ready to Swing Back?" Robert P. Fischelis.

"The Application of Salesmanship to Proprietary Remedies," J. G. Beard.

"Calculating the Retail Price of Drugs, Chemicals and Pharmaceuticals," John Culley.

"The Cost of Free Goods," W. Bruce Philip.

"Professionalizing Commercialism," Robert J. Ruth.

"Our Problems," Samuel S. Dworkin.

"A Merchandisable Acidophilus Culture," Josiah C. Peacock.

"What Does It Profit You?" P. Henry Utech.

"Exercising Our Prerogatives," Samuel L. Hilton.

"What Druggists Ask of an Editor," Walter M. Chase.

"A Research in Advertising," Samuel Wanamaker.

"The Value of the Recipe Book to the Retail Pharmacist," J. Leon Lascoff.

NOTES.

State Association items will be continued in September JOURNAL. Also the program of the A. PH. A. Sections. For Association meetings of this month see p. xvi.

The Pharmacy Exhibit at the Sesqui-Centennial International Exposition occupies 600 square feet in the Medical Science Section of the Palace of Education and Social Economy. —See it Saturday, September 18.

PROGRESS TOWARD REALIZATION OF THE A. PH. A. HEADQUARTERS—A MESSAGE FROM CHAIRMAN H. A. B. DUNNING OF THE CAMPAIGN COMMITTEE.

It is with much gratification that I am able to inform the pharmacists of this country, allied interests and their friends, that the great enterprise in which they are interested and which has received their splendid support, is steadily and surely making progress towards its goal. I speak, of course, of the Pharmacy Headquarters Building project, which is to represent and serve all pharmaceutical interests, manufacturers, wholesalers and retailers.

Through the *Pharmacy Headquarters Bulletin* and, especially, through the continued coöperation of the drug journals of the country, interest in the great undertaking for pharmacy has been kept alive, has never seemed to wane. The project is better known to-day and is better understood than ever before and it is astonishing, so far as my information goes, that every interest in pharmacy is for the enterprise and none against it. At least, if there are any against it, the numbers are few and their influence negligible. The undertaking has come to be realized as a great cause, which will reflect great credit upon pharmacy and give splendid service to the representatives of our calling.

The aggregate amount of subscriptions is now considerably in excess of half a million dollars, more than $100,000.00 having been added since the last meeting of the AMERICAN PHARMACEUTICAL ASSOCIATION. A number of States, which were not represented at all, or only in a small degree, have made substantial subscriptions during the past year. A considerable number of large subscriptions has been added to the fund by manufacturing pharmaceutical houses, especially those representing proprietary interests. The students of pharmacy have possibly made the greatest addition to the fund this year and should have special commendation. Several wealthy philanthropists have become at least tentatively interested in the project and it is hoped that some of these may decide to use some of their surplus for the endowment of the operations of the Headquarters Building under some such plan as was formulated and utilized by the Rockefeller Foundation.

Several smaller endowments are in prospect, such as the library, museum, etc., and, as has repeatedly been announced, the research department has already been provided for.

We need a considerable number of $100.00 to $500.00 subscriptions on the semi-annual ten payment basis, from the retailers, a small number of $500.00 to $2500.00 subscriptions from the wholesalers and small proprietary manufacturers, a few $5000.00 to $25,000.00 subscriptions from the large manufacturing pharmaceutical houses, or big proprietary interests, and one or more $100,000.00 to $250,000.00 endowments from the half a dozen very rich men, either representative of pharmaceutical interests or associated with them, who are philanthropically inclined and wish to do a great service to pharmacy and the public and who also desire to perpetuate their memory in the minds of men.

SOME OF THE CHAIRMEN OF THE PHILADELPHIA MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

Left to right—bottom row: R. H. LACKEY, Chairman of Sporting Activities; W. L. CLIFFE, Chairman of Speakers; AMBROSE HUNSBERGER, General Chairman; R. HENDRICKSON, Chairman of Entertainments; O. W. OSTERLUND, Chairman of Finance.

Left to right—top row: ROBERT J. RUTH, Secretary; B. C. GOODHART, Chairman of Hotels; J. C. PEACOCK, Treasurer.

Unfortunately, the following Chairmen could not be present when the photograph was taken: MRS. AMBROSE HUNSBERGER, Chairman of Ladies' Committee; ROBERT P. FISCHELIS, Chairman of National Publicity; CHARLES H. LAWALL, Chairman of Local Publicity; W. J. STONEBACK, Chairman of Registration; HARRY SWAIN, Chairman of Veterans; J. R. MINEHART, Chairman of Allied Professions; M. M. SMITH, Chairman, Hospitality; J. W. E. HARRISON, Chairman of Information.